

# Development of the Research and Study Farm "Vecauce"

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Research and Study farm "Vecauce"

**Abstract.** The paper deals with the development of the Research and Study farm (RSF) "Vecauce" of the Latvia University of Agriculture (LLU), the last 20 years in particular (1990-2009). Since its foundation in 1921, the farm has been continuously in operation. After the 2nd World War, the well-developed farm was totally destroyed but thanks to the efforts of its staff it was renovated and high results were achieved in production and research. In 1967, the field research at "Vecauce" was interrupted because of the foundation of the research farm "Jelgava", which was situated closer to the LLU. After regaining the sovereignty of Latvia, "Vecauce" was not privatized owing to the efforts of the farm and LLU staff. In 1998, the "Law about RSF "Vecauce" of Latvia University of Agriculture" was passed by the Parliament of Latvia providing conditions for further development of the farm as a research and study base for all levels of students and staff of the LLU, and protecting the farm against privatization. The paper also covers development of the study subject "Practical Agriculture" which is realized at "Vecauce". The research directions in animal science, veterinary medicine, and farm mechanization are briefly analyzed. The conditions of the renovation of field research at "Vecauce" in 1993 are discussed, and the subsequent wide broadening of field research topics is analyzed. The importance of the agricultural exhibition at "Vecauce" (since 1995) and scientific-practical seminar "Harvest Feast at "Vecauce"" (since 2001) is described. A conclusion is drawn that the development of the RSF "Vecauce" provides further challenges for student and farmer training as well as for research diversity.

**Key words:** legal status, agricultural production, research work, training of students, "Vecauce" exhibition.

## Introduction

The Faculty of Agriculture of the Latvia High School (later University of Latvia) was certain about the necessity for a research and study farm since the first days of its foundation. For that purpose, in 1921, after including all the land of estates in the State Land Stock, as the most suitable was recognised Vecauce. It was located side by side with town Auce and only 1.5 km from the railway station. The founder of the Research and Study farm "Vecauce" and its 1st director was the outstanding scientist, professor J. Bergs. The total area of the farm before the 2nd World War was 388.8 ha. Despite the necessity to purchase seed and equipment and renovate the farm, which was destroyed during the First World War, active research was started immediately after its foundation.

At the RSF "Vecauce", during first five years of its operation, scientific and training laboratories were established and equipped. Research was possible mainly in crop cultivation, beekeeping, fish farming, and agricultural management; also some pig and cattle feeding experiments were done. Testing of landraces and local varieties of a wide range of field crops, such as barley, rye, oat, potato, fodder and sugar beet, cabbage, Swedish turnip, carrots, red clover, orchard grass, tobacco plants, yellow lupine, etc., was started. In parallel, research on seeding rates, planting and cultivation operations (for instance, weed control), fertilizing and soil liming was done. Breeding of wheat, rye, and oat was carried out, which resulted in three new varieties: 'Vecauces skujinpuzas' (in Engl. 'Needle Oat of Vecauce'), 'Vecauces vienpusauzas' (in Engl. 'Single Side Oat of Vecauce'), and 'Vecauces rudzi' (in Engl. 'Rye of Vecauce'). The research results were reflected in the diploma works of students as well as in papers written by the teaching staff. The RSF "Vecauce" also took part in agricultural exhibitions, where it received awards and medals for its achievements (Bergs, 1926).

During the next 13 years (1926-1939), training and research work was activated. Students did their practical training in crop production from spring till autumn – they had to accomplish individual tasks in crop growing and study peculiarities of crop development. The research field then occupied 12 ha and was organized into eight smaller crop rotation fields, but the other farmland was used for crop production. Very different topics were investigated for the diploma works, only few examples: "Biology of

rye flowering" (student R. Eidemanis, 1935), "Fertilizing effect on yield and its chemical composition of different barley varieties" (student F. Villa, 1927), "Studies on field research methodology" (student O. Eiduks, 1933), "Investigations on meadow fescue seed production manner" (student J. Būmerts, 1937).

The teaching staff of the Crop Production Department studied field crop varieties within their research and afterwards advised farmers the best varieties. Also planting and harvesting time, first-stage processing of the yield (drying and cleaning), forage production for animals, different cultivation methods, and seed production was studied (Dermanis, 1940). In addition to the rich range of field crops investigated during the first years after establishment of the farm, later several other crops were studied: maize (a high fresh yield of whole plant of 50 t ha<sup>-1</sup> was obtained), millet for hay (recognized as worse if compared with locally suitable legumes), buckwheat (should be sown at the end of May), beans (most suitable varieties were ascertained; fertilizing with N proved to be ineffective), mustard (high N demand; good for green forage; best type – white mustard), rape and turnip rape (risky crop due to low winterhardiness), poppies (varieties; N fertilizing; opium output), sunflower (good as silage crop; different N demand when grown for seed or for silage; some breeding work), caraway (increase in N rate increases also the seed yield), flax (more suitable varieties were detected and early sowing was recommended), hemp (fertilization with N is important; sowing in rows is better if compared with diffuse sowing), matricary (yield of flowers increased with increased N fertilizer rate; higher content of essential oils was noted during the first part of summer), valerian (autumn was recognized as the best time for planting, October – best time for harvest; rich N fertilization is needed), and peppermint (N fertilization; content of essential oils; stimulation of winterhardiness by compost top dressing in autumn) (Dermanis, 1940). Vulnerary plants were grown at "Vecauce" from the 1930s, where was the biggest nursery (10 ha) of vulnerary plants in Latvia (Jelgavas Lauksaimniecības ..., 1941).

Some data are also found about animal research before the 2nd World War. For instance, the outstanding scientist P. Rizga organized a bee garden and a poultry farm at "Vecauce". He was an advisor of students' diploma works in this field and also made some very important innovations. P. Rizga designed a modern poultry farm building with four sections (later called "the Vecauce-type poultry farm design"): incubation of chickens, keeping of pullets, section for laying hens, and section for feed preparation. Besides, P. Rizga also designed new types of bee-hives, for instance, Auce's upright bee-hive. He organized a honey laboratory and the bee-keeping museum too, and a lot of research and advisory work was done in bee-keeping and poultry farming (Pēteris Rizga ..., 1985).

The RSF "Vecauce" developed into a big, many-branched model-farm during the times of the first independent Republic of Latvia.

During the 2nd World War, the farm continued its work. After the war, "Vecauce" was totally destroyed again: all animal sheds, and hay and cereal barns were burned down, fixture equipment was dragged apart, and roofs of dwelling houses were shot up. The fields were ridged by entrenchments. Nevertheless, 25 highly productive Latvian Brown dairy cows and 12 horses were saved by the staff of the farm. Despite the heavy damages, "Vecauce" started its operation again in the spring of 1945.

Just after the war, dairy and pig farming as well as vegetable growing were chosen as the main branches of the farm. Later, in 1946, also sheep breeding was started. Owing to effective farming, renovation of buildings, amelioration of fields and research and innovations were undertaken again. The farm area increased incorporating the surrounding collective farms, and made approximately 1800 ha in 1954.

The main efforts in animal science at that time were connected with breeding and improvement of Latvian Brown dairy cow breed, Latvian White pig breed, and Latvian Dark-headed sheep breed. Research was carried out also into other topics: feeding of animals, keeping methods, pork production, wool production and quality, young stock breeding, etc. The most important task of crop production was forage providing (Rezevska u.c., 1954). The leading research directions were similar to those before the 2nd World War. Besides traditional crops and research directions, less known crops and topics were studied, for instance, senior lecturer A. Valainis studied vernalization of spring and winter crops, docent J. Lucāns studied maize, senior lecturer P. Freimanis – *Taraxacum kok-zaghiz*, senior lecturer M. Ozoliņa – soybeans, and assistant I. Holms – field beans. Research in grasslands was carried out by professor V. Tērauds (the

pastures arranged under his guidance were among the best in Latvia), but root crops were studied by the manager of research field J. Lauva. The political situation required that the researchers unconditionally surrendered to the ideas of T. Lisenko, but honest scientists tried to find the golden mean when reflecting their solutions to scientific problems (Lauksaimniecības zinātne ..., 2000).

From 1957 up to the end of 1960s, students from the Faculties of Agronomy and Animal Husbandry were spending one year of their study time at "Vecauce", which included practical training as well as theoretical courses. The total number of field experiments carried out at "Vecauce" for the course and diploma works of students were some thousands. Since these years "Vecauce" is called "Mecca of Agronomists". Unfortunately, after complete formation of the Research and Study Farm "Jelgava" (in 1967), practical training of students as well as research work in field crops was interrupted at the RSF "Vecauce".

Nevertheless, this process did not affect the research in animal husbandry and exemplary farming. From 1960s to 1990, the total land area of the farm made up 2660-2797 ha, including 2323-2390 ha of agricultural land. A high average field crop productivity, which was high for those times, was obtained: cereals – 3.5-4.0 t ha<sup>-1</sup>, potato – 19.0-25.0 t ha<sup>-1</sup>, forage root-crops – 49.7-59.6 t ha<sup>-1</sup>, and hay 5.1-6.0 t ha<sup>-1</sup>. In 1961 the farm was acknowledged as a specialized certified seed grower (including maintenance breeding) for cereals (barley, later also winter wheat), peas, wetch, and potato (Vecauce ..., 1981).

A lot of self-made innovations for practical farming were made by the farm staff, for instance, equipment for preparation of liquid N fertilizer, a 12-m-wide cultivator for high-capacity tractor K-700, a special bar sprayer for pesticides and liquid fertilizers, equipment for mechanization of field work in orchard, a hay drying facility, etc. Up to 1990, several new farm buildings for dairy cows, calves and pigs, a new grain drying and cleaning facility, a specific drying and cleaning facility for the seed of grasses and legumes, a mechanical workshop, facilities for storage of potato and fruits, a woodworkers' workshop, a vegetable and fruit cannery, apartment houses for farm staff, etc., were built. People from different parts of the former Soviet Union arrived there to learn. "Vecauce" received the breeder's certificates for breeding three new Latvian Brown dairy cow lines (BL-1 in 1979, BL-2 in 1981, and BL-3 in 1985). The average milk yield reached more than 5000 kg per cow per year at the end of the 1980s. Successful was also pig breeding work with Latvian White and Large White breeds, which resulted in development of several high-quality boar lines. As to sheep breeding, the wool quality of the Latvian Dark-headed sheep was exceptionally improved by crossbreeding with Argentina Corriedale sheep, and a new sheep line was established with ram Varis born at "Vecauce". In 1988, the total number of livestock included: cattle – 1843 (of which 670 were dairy cows), pigs – 1914, sheep – 250, and bee families – 60. Up to 1980, the farm had also poultry – 1000-2000 heads, mainly laying hens.

Such very strong, long-time traditions, necessity for students' practice, and scientific work of students and teaching staff as well as good results achieved in farming were the reasons why the farm was not privatized after regaining independence of Latvia in 1990.

**The aim of the paper** is to describe in detail the development and activities of the Research and Study farm "Vecauce" of the Latvia University of Agriculture in the independent Republic of Latvia during the last twenty years – from 1990 to 2009.

### **Legal Status of the RSF "Vecauce", Specific Regulatory Documents Concerning the Farm, and the Main Tasks of "Vecauce" Nowadays**

Starting from 1991 several regulatory documents were adopted concerning existence of the farm "Vecauce". In June 1991, the Supreme Council of the Republic of Latvia made a resolution about privatization of agricultural collective and state farms, and collective farms of fishermen. In December of the same year, a list of exceptional enterprises was published and "Vecauce" was included into this list. The resolution determined that the RSF "Vecauce" is not being privatized at the moment; the process, terms and peculiarities of its privatization must be set by a special decision. Consequently, part of the land was given back to its previous owners on 1 September 1997, and part was bought out from the previous owners by the Ministry of Agriculture of Latvia and further delivered over to LLU for management of the farm. It was very important to protect the farm against total privatisation. Owing to joint efforts of the farm staff and leaders of LLU

it was achieved that the Parliament of Latvia passed a special "Law about RSF "Vecauce" of Latvia University of Agriculture" on 30 October 1998. The main points stated in the Law were:

- 1) RSF "Vecauce" is the property of LLU and is not subject to privatization;
- 2) RSF "Vecauce" is the base of training and scientific work for students of all levels – professional, bachelor, master, and doctoral students.

The Rules of the farm stated: "The aim of RSF "Vecauce" of LLU is to secure the scientific, pedagogical and economical activities of Latvia University of Agriculture".

Since its first registration in the Company Register of the Republic of Latvia in 1991, "Vecauce" has changed its name and business type several times: from 1990 to 1999 it was a public enterprise, from 1999 to 2004 – a public, scientific non-profit organization, but since 2004 – a limited liability company. Studies, training and research are the main tasks of the farm nowadays. It should be pointed out that through the years the farm has survived mostly thanks to its own money earned in the production. The first European funds (for instance, SAPARD) were not available for public enterprises. On the basis of the first "Special Purpose Program of "Vecauce" Development 1999-2001" (worked out in accordance with the "Law about RSF "Vecauce" of Latvia University of Agriculture"), the first funding (78 730 LVL) from the state budget for research and study purposes was received in 1999 (Latvijas Lauksaimniecības ..., 1998). Later continuations of this program were worked out on a regular basis (Latvijas Lauksaimniecības ..., 2004). All the "Special Purpose Programs of "Vecauce"" emphasize three main interrelated directions of the farm work nowadays: 1) many-branched production of agriculture products, 2) teaching and practical training of students, advisory work, and 3) research in agriculture.

### **Agricultural Production at "Vecauce"**

All three main directions of the operation of the RSF "Vecauce" have the same significance. For the teaching of students and advisory work with farmers, modern exemplary production is needed, but problems related to production can be solved by research. Such type of farm as "Vecauce" provides continuous linkage between studies, research, and production.

For its operation the farm has to earn the most amount of money by means of production. At the beginning of the survey period the farm was in good condition. Total land area on 1 September 1997 was 2.6 thousand ha, of which agricultural land was 2.3 thousand ha. High average yields of field crops were obtained in 1990: small grain cereals – 4.3 t ha<sup>-1</sup>, forage root-crops – 50.0 t ha<sup>-1</sup>, potato – 22.6 t ha<sup>-1</sup>, hay – 5.8 t ha<sup>-1</sup>. Certified seed of winter wheat, spring barley, oat, peas, several varieties of potato, red clover, and timothy was grown. Almost 1000 t of certified cereal seed was sold per year. Maintenance breeding of winter wheat, spring barley, peas, and potato was done. As mentioned above, since 1987, the milk yield per cow per year exceeded the 5000 kg border, and made up 5476 kg per cow in 1990. Milk and meat as well as pedigree cattle of all species were produced on the farm.

The succeeding 10 years were hard for the farm. Equipment and production infrastructure were gradually wearing out. During the first years of the independent Latvia "Vecauce" encountered difficulties in selling the products; usually payment for the products delayed for several months or even longer. At the same time, money was needed to purchase fuel, mineral fertilizers, pesticides, and electricity. Therefore, in 1993, small milk and meat processing plants were established. Nobody knew what kind of products will be needed the next year: one year certified seed was sold with good success, but the next year farmers did not buy it. "Vecauce" has survived inflation, replacement of the Soviet rouble by Latvian rouble (which, in its turn, later was replaced by Latvian Lats), and bankruptcy of the bank "Baltija". During the ten years concentration of production was made, operation of some branches was ceased and of some was changed, the staff number was reduced. In 2000, the pig farm was sold out due to the crisis and unstable situation in pork production in Latvia. In the same year, sheep breeding was interrupted. Glasshouses as a branch were liquidated in 2002; milk and meat processing was ceased in 2003. The years after 1990 were difficult and the staff worked self-denyingly for survival of the farm. Unfortunately, the high level of production decreased and was again reached only in 2004-2005.

As SAPARD funding and similar European funds were not available for public enterprises, "Vecauce" tried to attract investments from different projects in order to improve the material-technical basis of the production. During the last part of the

1990s, owing to the co-operation program with Nordrhein-Westfalen, state subsidies and farm-earned money, several modern agricultural machines were obtained, new cereal drying facility TORNUM was designed and built up, and four different-type milking equipments (Delaval, SAC, Stranko, and Larta-Stranko) were put up.

The land area decreased after 1997 (see the previous section), but at present it is varying from year to year since part of it is rented from the private owners – the total managed land area of the farm constitutes 1.8-1.9 thousand ha, but agricultural land 1.5-1.6 thousand ha. Up to now certified seed production has been maintained at "Vecauce", and during the last years the amount of realised certified cereal seed has increased (Fig. 1). Diversity of grown field crops has decreased due to economical reasons – mainly are grown winter wheat, winter and spring barley, winter oil-seed rape, maize for forage (in 2007-2008 also for biogas), and mixtures of clover or lucerne with timothy for forage. In 2008 the obtained yield for winter wheat was 5.1 t ha<sup>-1</sup>, for winter barley – 5.7 t ha<sup>-1</sup>, winter rape – 3.6 t ha<sup>-1</sup>, and maize for silage – 30 t ha<sup>-1</sup> of fresh matter yield (the season was too cool and dry for maize growing). Spring cereals (barley and oat) yielded less due to very dry conditions during establishment and tillering. At "Vecauce" there is also an orchard of 50 ha, but part of it is extensive with old big trees and should be renovated. New agriculture machines and tractors for field work have been purchased after the year 2000, but some are still urgently needed (for instance, maize and grass chopper\*, manure sprayer, etc.).

New activities have been undertaken in the 21st century. In order to optimize the cereal harvest, feed grain rolling and preservation was done in 2004-2005. In 2005, 775 t of barley grain was rolled. Despite the big pressure from Polish apple and vegetable growers on the Latvian market, 71.3 t of apples were exported to Poland in 2005.

At present only two livestock types are bred at "Vecauce" – dairy and beef cattle. Great job has been accomplished advance the milk production branch. The breeding work, increase in the quality of heifer growing, balanced feed ration, and qualitative milking equipment have favoured increase in the milk yield. As a result, starting from 2004, more than 5000 kg per cow per year are milked again (Fig. 2). A new farm building was designed in 2005, and built up and equipped during 2006-2007. For milking of 120 cows, two milking robots have been assembled, but the rest of the cows are milked in a parallel-type milking hall. Up to now very high-quality milk (low amount of somatic cells and bacteria per 1 ml of milk) has been sold to cooperative "Piena ceļš" (in Engl. "Milk Way").

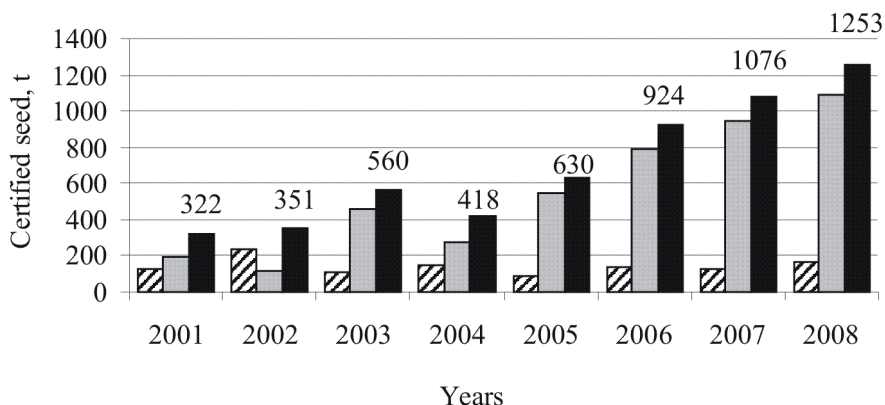


Figure 1. Realised amount of certified cereal seed (2001-2008): ▨ spring cereals, ■ winter cereals, ■ sold certified seed totally per year, t.

\* – was purchased after writing the paper in June 2009.

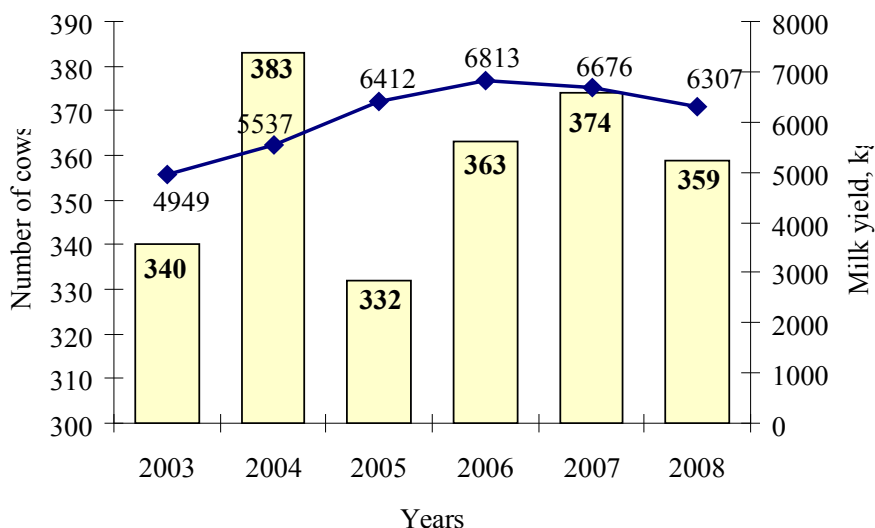


Figure 2. Changes in the average number of cows and milk yield per cow per supervision year (on October 1 of the respective year), 2003-2008: bars – number of cows; line – milk yield.

The beef cattle breeding was started with Hereford breed in 1995. Later also Limousin and Charolais cattle were added to the herd, and now the total number of cattle, depending on a year, is varying from 100 to 120 heads.

The most recent project realised at "Vecauce" was designing and building of the biogas production plant in 2007-2008. This is the first project of biogas production from manure together with plant biomass (silage from maize and other plants) in Latvia. Three biogas plants that use organic waste are operating now in Latvia, but in future the greatest potential of biogas production is related to agricultural sector: from 13 million m<sup>3</sup> of the biogas produced in 2011, about 64% will be produced using substrates from agriculture. The biogas produced at "Vecauce" is used for electricity co-generation; the planned capacity of the plant was achieved in March 2009.

The RSF "Vecauce" nowadays is a unique centre for studies and research, and is characterised by a great diversity of soils and relief. It is a many-branched farm where plant production with specialisation in seed multiplication and forage production occupies a stable place, but the main specialization in animal husbandry is milk production and beef cattle breeding. The new project – biogas production and electricity co-generation – was launched in 2008.

The farm "Vecauce", like Riga, is never finished. New plans, connected with increase in the biogas production capacity and improvement of the dairy farm with a room for veterinary services, already occupy the minds of the farm staff.

During this period, directors of the RSF "Vecauce" have been agricultural engineer L. Teteris (1986-2003), economist A. Aizsilnieks (2003-2008), and starting from May 2008 agronomist I. Grudovska. As head agronomists have worked D. Upmacis, I. Zaika, and A. Čapus, but as head zootechnicians – I. Brahmane, I. Klovēne, I. Eihvalde, and E. Guša.

### Teaching and Practical Training of Students at "Vecauce"

The period from 1990 to 1998 was characterized only by students' practical training and practical work in the fields and farms. Get-together meetings of agronomists took place at "Vecauce" on a regular basis at that time. Constantly there were discussions about the role of the practical training of the new agronomists and other professionals who are engaged in agriculture or have some work in the countryside. The leaders of "Vecauce" considered teaching of students in real production conditions as vitally important, which was greatly supported by LLU rector V. Striķis and vice rectors P. Bušmanis and

E. Bērziņš. As a result, completely new activities at "Vecauce" started in 1998 when the study course "Practical Agriculture" in the amount of 1 credit point was included into the 1st-year curricula of all faculties, and the course was accomplished at "Vecauce". The Training centre "Vecauce" was established under the guidance of the vice director, docent Dr.agr. I. Rūvalds who administered the centre and the study course "Practical Agriculture" until his sudden death on 22 September 2008. The aim of the study course until now is to introduce students to practical farming. "Practical Agriculture" provides insight into:

- operation activities and problems of a many-branched agricultural enterprise;
- technological processes of production;
- interrelation of different production branches;
- interrelation between one agriculture production enterprise ("Vecauce") and another;
- prosaic side of the rural life in general.

The course "Practical Agriculture" also helps students, who have chosen LLU for their studies and have arrived from villages, towns or Riga, comprehend what is agriculture, what and why people are doing in the countryside. Students are taught to be tolerant towards agriculture and to understand that the borderline of Latvia does not coincide with the borderline of Riga or any other town. During ten academic years, from 679 (in 2004/2005) to 928 (in 2002/2003) students per year have been studying this study course (Fig. 3). The number of students does not depend on the work of the Training centre, but on matriculation at LLU and on the quality of students – the number of students is dependent on university dropouts during the 1st year.

For one week the work is divided into lectures (in an auditorium of the Training centre) and practical training in specific production facilities: cattle-sheds, fields (during the season), cereal drying, cleaning and prepacking facility, orchard (during the season), fruit storage, mechanical workshop, woodworkers' workshop, Vecauce Palace, bookkeepers office, etc. The program was worked out in 1998 and till today is being improved and developed depending on the needs of the faculties and the changes going on at "Vecauce". In 1998, the study course had 14 sections and still has the same amount of sections (with minor changes in the 2008/2009 academic year). The content

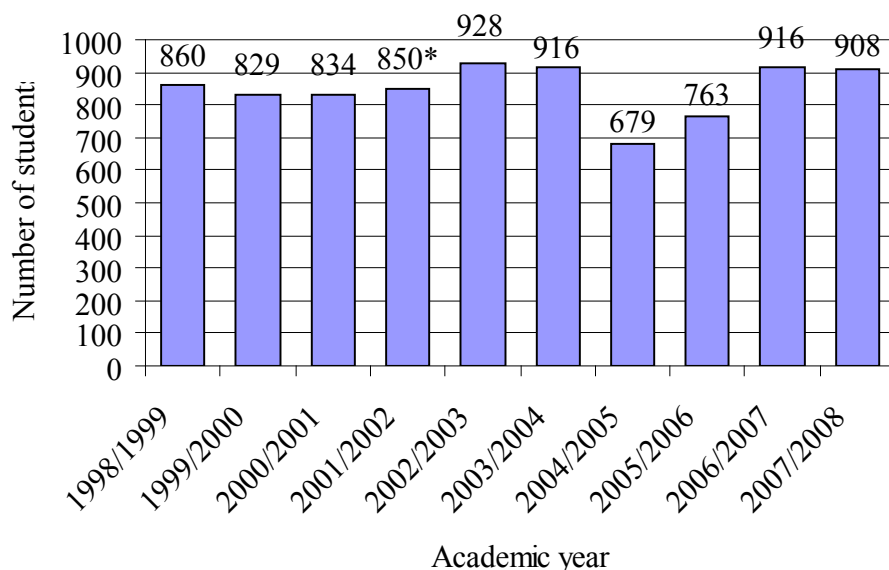


Figure 3. The number of students who studied "Practical Agriculture" at "Vecauce" during academic years from 1998/1999 to 2007/2008 (\* – approximate number; the exact number of students in the 2001/2002 academic year is lost).

of separate sections within the possible limits is coordinated with the specific needs of each faculty. A one-week job concludes with a written report and a seminar covering the main topics learnt during the week. The teaching staff consists mainly of the farm professionals; the LLU teaching staff only rarely is engaged in delivering the study course "Practical Agriculture".

At the end of the week, 100% of the students fill in a questionnaire about the content and teaching manner of the course and the household conditions at "Vecauce". Estimation is made by a three-rank order: good, satisfied, and unsatisfied. Almost invariably the answer of more than 50% of students is "good", but hardly ever "unsatisfied". It is possible that after years, when more knowledge and life experience is gained, students change their initial opinion. In 2003, a study was carried out by Mg.agr. J. Kopmanis to clarify the opinion of senior students about the study course "Practical Agriculture". Students from the Faculties of Agriculture, Economics, Social Science, and Rural Engineering (totally 108 students, i.e. 6-32% from the group of 3rd or 4th year students) were surveyed. Some examples from this questionnaire can help understand the importance of the study course:

- Have the things and processes seen at "Vecauce" helped to form your comprehension about agriculture? Yes – 80% of respondents;
- Has a week spent at "Vecauce" helped you to better comprehend the further study program in your Faculty? Yes or partly yes – 60-90% of respondents from the Faculties of Agriculture, Economics, and Rural Engineering; and 18% – from the Faculty of Social Science;
- Has a week at "Vecauce" enriched your life experience? Yes – 40-70% of respondents.

In co-operation with the Ministries of Agriculture, and Education and Science, an agreement was made that also practical training of students from agriculture professional schools will be organized at "Vecauce" in order to use the farm potential better. Starting with the academic year of 2004/2005, students from professional schools had their practical training at "Vecauce".

Work with young and inexperienced students differs from that with university students. Therefore special programs were worked out paying the main attention to practical training, but theoretical lectures were delivered in an elementary manner. Much work has yet to be done for simplification of the program. Also professional school students are asked to fill in the questionnaire about the training course at "Vecauce", and the opinions are positive. Unfortunately, in 2009, due to the economic crisis, the existence of some professional schools is doubtful and such are also training possibilities for professional school students at "Vecauce" in future.

During the ten years of the operation of the Training centre, not only study programs were advanced, but also household conditions were improved according to the financial possibilities and students' needs. The computer class with the Internet connection was the main acquisition.

In addition to "Practical Agriculture", the Faculties of Agriculture, Veterinary Medicine, and Rural Engineering realize field practices at "Vecauce" also in other study courses. Besides, at "Vecauce" several students do their long practical training course (couple of months) which is required for obtaining a professional diploma. The quality of any practical training completed at "Vecauce" is highly appreciated.

### **Agriculture Exhibition at "Vecauce"**

The first regional agricultural exhibition at "Vecauce" was organized in the post-Soviet Latvia in 1995. Since that time, regional agricultural exhibitions have taken place at "Vecauce" on regular basis – from 1995 to 2001 annually, but hereafter – once per three years (in 2004 and 2007). Approximately 80 participants offering products from Latvia, Sweden, Norway, Finland, Denmark, Germany, Belorussia, Russia, Poland and other countries have participated in the exhibitions. The offered products have included: machinery and equipment for crop production, equipment for cattle-sheds, feeding sources and supplements, agrochemicals, preparations of veterinary medicine, agriculture products' processing goods, spare parts for different kinds of equipment, seed and planting material for field and garden crops. Animal show, ploughing competition, demonstrations of different kinds of machinery (for crop production as well as animal husbandry) in production conditions, seminars, and advisory work have always been a part of the exhibition. In each exhibition a large number of demonstrated animals is



from the "Vecauce" herd; however, as since the year 2000 the farm has only dairy and beef cattle, the best animals of all other species are found by pedigree cattle breeding associations throughout Latvia. Field trials and demonstrations are inspected during the exhibition, and some advisory work is accomplished directly on the field.

The organizers of the exhibition are the "Vecauce" staff together with LLU and the Ministry of Agriculture. During the exhibitions, farmers have a possibility to meet the minister of agriculture and discuss the further development directions of agriculture in Latvia and in connection with common agricultural policy of Europe. The LLU staff participates in the organization of seminars, field demonstrations of machinery, and ploughmen's competition. The exhibition is financed mainly by the Ministry of Agriculture from the state subsidies, but some of the funds are always allocated by "Vecauce" and LLU.

In the last exhibition (in 2007), together with the Young Farmers Club of Latvia, an extensive program was organized for the new generation of farmers (students from secondary-level agriculture schools). Something new is always invented to make the exhibition more interesting and educational for the farmers and rural inhabitants.

"Agricultural Exhibition at "Vecauce"" is a traditional event during full bloom of a summer, where not only farmers, but everybody can find something of interest – young people can learn more about agriculture, and families with children can simply rest from their daily routine. At the same time, a lot of job is done – some contracts made, advice received, partners and friends met, and new directions of agriculture development discussed.

### **Main Directions of the Research Work Performed at "Vecauce" in 1990-2009**

The RSF "Vecauce" is not a scientific institution, but a research base for all levels of students (bachelor, master, and doctoral) and staff of LLU. From 1990 to 1998 there were no researchers with a doctor's degree employed at "Vecauce", but in 1988 two researchers with a Dr.agr. degree were taken on: vice director responsible for teaching work, Dr.agr. I. Rūvalds with specialization in animal husbandry, and vice director responsible for research work, Dr.agr. Z. Gaile with specialization in crop production. The research has been carried out mostly by LLU scientists or by students under the guidance of their advisors from LLU. As to the technical staff, it has been provided mostly by the farm. Thus, the obtained results and the conclusions derived from them should be described by their authors. Further on are described: main research directions at "Vecauce" during 1990-2009, results of research which were important for the development of the farm or which were carried out by the researchers of the farm, and renewal and development of the research field. It should be pointed out that the possibility of carrying out experimental work in small plots and with experimental animals as well as to demonstrate achievements of agricultural sciences in production conditions is unique to "Vecauce".

**Animal Husbandry.** Research in animal husbandry has been carried out during all the years since the foundation of the farm owing to the high quality of the "Vecauce" herd of any animal species. Projects in animal science, veterinary medicine and animal farm mechanization have been implemented. "Vecauce" entered the survey period with three animal species: dairy cattle, pigs, and sheep (see above sections "Introduction" and "Agricultural production in "Vecauce""). Important was realization of some parts of the National Project "Improvement of productive animals and poultry breeds bred in Latvia using breeding methods approved in the world"; subtopic "Origination of a new type within dairy cow breed Latvian Brown" was realized using the "Vecauce" herd under supervision of professor J. Sprūžs. Within this project, Dr.agr. Z. Grīslis and L. Žuka studied the possibilities of evaluating the breeding value of Latvian Brown sires in sharply variable environment. The computer package PEST was used and data of the bulls' and cows' breeding value showed independency from environmental conditions, i.e. objective assessment was possible. Dr.habil.agr. L. Cjuk a and Mg.agr. D. Kairi came to a conclusion that for the improvement of the exterior of Latvian Brown cow (especially the shape of udder) American Swiss is the best, but fat and protein content is higher if breed Angler is used (Latvijā audzējamo ..., 1998). The heifers' breeding quality is important for milk yield increase, reproduction ability of cows, and prolongation of the productive life of dairy cows. In detail it was studied by Dr.habil.agr. L. Cjukša. Further the main directions of the research were as follows: improvement of milk yield of

Latvian Brown dairy cow using sires from different breeds, and evaluation of the exterior of cows with different pedigree and the exterior in connection with productivity and resistance of animals. Mg.agr. D. Kairi a and Mg.agr. D. Jonkus found out that for further improvement of the "Vecauce" dairy herd Danish Red sires should be used (Produktīvo dzīvnieku..., 1999).

Pig breeding was studied by Dr.agr. A. Veģe, Dr.agr. M. Jansone, and Mg.agr. Z. Bērziņa at the "Vecauce" pig farm "Pūpoli". Very topical in the 1990s was improvement of pork quality by decrease of backfat thickness of Latvian White (LB) breed pigs. The best result for obtaining F1 sows showed the crossing of Latvian White with German Large White (Deutsches Edelschwein) (VD) breed, but for pork improvement mating with Pietrain (P) breed boars was planned (Latvijā audzējamo ..., 1998). Pork quality evaluation with ultrasound equipment in live pigs was started at "Vecauce" owing to the efforts of Dr.agr. I. Rūvalds. Later, different crosses were made and pork quality was evaluated. Sometimes crosses of Latvian White breed with two foreign breeds (e.g. (LB×P) ×VD) gave pork with firm, wiry and rough muscle fibre (Produktīvo dzīvnieku..., 1999).

Up to destruction of the sheep herd at "Vecauce", the research on the improvement of Latvian Dark-headed breed using Il-de-France and Texel breeds was carried out by Dr.agr. J. Volgajeva, which improved fertility and precocity of sheep (Produktīvo dzīvnieku..., 1999).

Animal nutrition was studied by three doctoral students (A. Balode, L. Degola, and A. Trūpa) under guidance of Dr.habil.agr. J. Latvietis. Mainly new premixes for animal feeding were evaluated.

Later, in 2000, when work with pigs and sheep was finished at "Vecauce" only two kinds of animals were left for researching: dairy and beef cattle. This and succeeding improvements in animal keeping changed the research directions at the farm. Comparison of different breeds, beef quality improvement using different crosses, and economic efficacy of beef production were studied by bachelor and master students under guidance of Z. Grīslis and D. Kairiša.

When Latvia entered the European Union in 2004, and even before it, new demands for milk and meat quality and animal welfare were set up. Dr.agr. D. Kairiša studied new methods of milk quality assessment, but Mg.agr. D. Jonkus, for obtaining Dr.agr. degree, analysed variability of cow milk productivity characteristics (supervisor Dr.agr. L. Paura). Possibility of studying interesting topics on cow adaptability to changes in the keeping system (transition from tied system to free keeping system), which was provided by the new cattle farm built in 2007, encouraged the researchers to start new projects actively. Most recently (in 2008), I. Muižniece for earning her doctor's degree, under guidance of Dr.agr. D. Kairiša, started a study on comparison of milking technologies (milking by robot and in milking hall) and their influence on milk productivity and quality, and on reproductive ability of a herd. Urgent was the question about finding the milk freezing point. Such study was ordered by the Ministry of Agriculture, and now has been already accomplished, partly also at "Vecauce", by Dr.agr. D. Jonkus.

From the Faculty of Veterinary Medicine, the most active user of the research base at "Vecauce" was assoc. prof. V. Antāne. Before 2000, her research work was mainly connected with fertilization problems of productive animals and reasons for abortions, but later on she studied problems related to udder protection and mastitis. V. Antāne's most recent study, completed in 2008, was on the activity of humoral immunity and its regulation possibilities in udder pathology of dairy cows. As the new dairy farm provides novel challenges also for the researchers of veterinary medicine, Dr.med.vet. V. Antāne is going to start a new project in 2009 about cow udder health and milk quality problems in connection with the use a milking robot. In total, four studies for obtaining Dr.med.vet. have been carried out at "Vecauce", but still none of them has been defended – the authors are diligently preparing for their theses presentation.

At "Vecauce" the staff of the Technical Faculty has studied topics mainly connected with cattle-shed mechanization problems and designing. The work has been particularly activated during the recent years after building the new dairy farm and putting on the latest equipment (milking robot, milking hall, automatic stations for feeding of concentrates). Several bachelor papers and one research work for earning Dr.ing. have been carried out. Also grants of LCS and LLU internal projects on farm mechanization problems important for "Vecauce" have been realized. The supervisor for most of the projects and student research was professor J. Priekulis.

**Field Crops and Horticulture.** The research into field crops during the last 20 years can be divided into two periods: the first from 1993 to 1998, and the second from 1999 to 2009. Renovation of the research field and first investigations into different forage crops, mainly maize and lucerne from USA, characterize the first period. The second period is characterised by provision and development of the material and technical basis of the research work and by enlargement of the field trials, which was possible owing to mechanization of the most of the field work and later also the laboratory work.

As told above, during the late 1960s, research of field crops was interrupted at "Vecauce", and since that time has been performed mainly at RSF "Jelgava" but later – at "Pēterlauki". After regaining the independence of Latvia, several co-operation programs with different Western countries were launched. The research field was renovated in 1993 thanks to the enthusiasm of the RSF "Vecauce" staff and involvement in the "Co-operation program between Department of Agriculture of USA and Baltic States". Eight varieties of lucerne and twelve maize hybrids (mainly originated in USA) occupying ~400 m<sup>2</sup> were grown on the research field, and all work was done mainly by hands. The "Vecauce" staff were very interested in studying these crops as lucerne and maize were researched and produced on the farm already before the 2nd World War. Lucerne provides animals with cheap protein, but maize – with cheap energy. The responsible for investigations and renovation of the research field was agronomist Z. Gaile together with the staff of the Cereal and Potato Maintenance Breeding Department. Within the co-operation program with the USA Department of Agriculture, Z. Gaile several times visited the USA including also the Wisconsin University in Madison, where she improved her professional skills.

Later also other varieties were included, and the area allocated for trials and demonstrations was enlarged. Main research directions within the program (1993-1997) were suitability of lucerne varieties, their regrowth potential and winterhardiness. The research results showed that winterhardy-enough lucerne varieties bred in North America (USA and Canada) can be grown in Latvia with a success similar to that of local varieties ('Mežotnes' and 'Skrīveru' from Latvia, 'Birute' and 'Zydrune' from Lithuania, and 'Jegeva-118' and 'Karlu' from Estonia). At the same time, the introduced varieties were characterized with good stand persistence, faster regrowth after cuts and in spring, and with higher yield potential if compared with varieties bred in Latvia (Gaile, 2000a; Gaile, Adamovich, 2002). As mainly foreign lucerne varieties are sown in Latvia, winterhardiness of a variety is of high importance. Standard methodology of an accelerated lucerne winterhardiness test (during one winter) was adopted in Latvia. It includes exposure of lucerne plants to strengthened stress during the sowing year (thinned stand, cutting three times including a cut during closed time in September), and afterwards evaluation of the survived plants in the next spring according to a 5-point scale as well as rating comparison with the check varieties. A conclusion was made that the varieties from three most winterhardy groups and in addition also those from the fourth group which showed good results in yield evaluation trials are suitable for Latvia (Gaile, 2003).

Each year several field days and seminars were organized to demonstrate farmers the benefits of lucerne and maize as well as the growing technologies. Several variety demonstrations were arranged along the big roads labelled with posters to attract the interest of farmers. "Vecauce" was among the first farms which used the modern technology for haylage production – big bales wrapped in plastic. This was also the subject for organizing field days and seminars with participation of experts from the USA (one of them was D. Undersander, PhD, the outstanding scientist from the Wisconsin University in Madison).

Another research direction was evaluation of early-maturity maize hybrids and demonstration of a completely new growing manner aimed at prolonging the vegetation period (including late September harvest even after autumn frosts if they occur) and at obtaining the maximum possible dry matter (DM) yield at the soft dough till wax ripeness (DM content – 28-30% or at least 25%) stage. Totally, during five years (1994-1998), 63 different hybrids were tested; their cold tolerance during spring was observed, development during vegetative period was described, proportion of leaves, stems, and corn-cobs in the total yield were evaluated, and, for the first time in Latvia, yield quality was estimated by determining the neutral detergent fibre (NDF) and acid detergent fibre (ADF). The analyses were performed in the Tartu University laboratory (methods for NDF

and ADF analyses were not still adopted in Latvia in that time) (Gaile, 2000b; 2000c; 2000d).

During this period, student research with field crops was not carried out mainly due to lack of special small-scale research equipment for field work mechanization. The first field research work in the independent Latvia for earning the doctor's degree was performed during 1995-1997. Z. Gaile carried out the study "Evaluation of selection criteria for maintenance breeding of spring barley variety 'Klinta'" under supervision of Dr. biol. I. Belicka, and defended it in 1998. The research results showed the main selection criteria for elite plant selection (elite plant model was developed) and for selection in the nurseries of next pedigree generations (phenotype was noted as the main criterion) (Gaile and Belicka, 1998).

The main achievement of this period was renovation of the research field and gaining of assurance that "Vecauce" is a serious player side by side with the research institutions and is recognized by the farmers as a consultancy provider. It should be pointed out that this was acknowledged by foreign partners earlier than by Latvian side.

The second period of field research development started in 1999. The co-operation program with USA Department of Agriculture was completed, and foreign partners from Nordrhein-Westfalen noticed the accurate, hard manual labour by the staff of the research field. Within the frames of a co-operation program (concluded thanks to the efforts of Dr. agr. I. Rūvalds, and Dr. J. Weiss and Mr. P. Michel from Nordrhein-Westfalen), as a donation were received: a plot drill Hege-80 together with tool carrier Hege-75, and a small plot combine Hege-140. Later also other important field and laboratory equipment were obtained thanks to different research and infrastructure projects (especially starting from 2006) as well as co-operation agreements with commercial agriculture supply companies.

Another important event accelerating the development of the research field was "The Law about RSF "Vecauce"" and the funding received for studies and research in connection with this law and on the basis of the first "Special Purpose Program of "Vecauce" Development 1999-2001". It was the first additional money allocated for research purposes which was used according to a special program. As a result, many different-level student researches were carried out, and the number of research topics expanded mainly in connection with the needs and unsolved questions of "Vecauce" or farmers-visitors of the farm. By organizing the field days and seminars on the basis of the research field and together with the staff of the Faculty of Agriculture (most active were professors I. Belicka, I. Turka, D. Lapiņš, A. Bērziņš, M. Ausmane, B. Bankina) and by making use of the results obtained there, the research field gained the status of a reliable partner among the parties interested in field research: Faculty of Agriculture, Advisory Centre in Ozolnieki, farmers, commercial companies. Everything was prepared for the next step – research on the basis of contracts, which started in the year 2007. According to the contract, a customer pays for realization of a definite experiment or, in some cases, only for technical assistance. Thus, funds for research come from the Latvian Council of Sciences (LCS), Ministries of Agriculture, and Science and Education, The Latvian Rural Advisory and Training Centre, the State Plant Protection Service, and commercial agriculture supply companies. If critically needed, some field trials can be arranged for student research work without special financing.

Starting with 1999, the number of research topics and plots in the research field gradually increased. Initially, in 1993, one special field for research was allocated – field "Pils dārzs" (in Engl. "Garden of Palace"), 3.5 ha in area. When the number of studied field crops increased, the trials were arranged in different fields according to the appropriate crop rotation. It was not comfortable neither for the production unit of the farm, nor for the staff of the research field. Starting with 2003, another field was allocated mainly for research purposes – field "Aizaploki" (in Engl. "Behind the Pasture-Ground"), 50 ha in area. Besides, urgent was also research in organic farming conditions. Therefore certification process of a special organic research field (14.67 ha) was started in 2002. At present, the total area of special research fields in "Vecauce" makes 68.17 ha. However, some studies are still performed in big production fields due to the necessity to use farm-scale equipment (for instance, investigations in precision farming, some specific questions of growing technologies).

At the beginning, technical work of the research was performed by the Department of Maintenance Breeding, which step by step was reorganized into a department called "Study and research field". Six to seven full-time employees are engaged in carrying

out the research: vice director for research work (Dr.agr. Z. Gaile – 1998-2009, Mg.agr. O. Balodis – from 1 April 2009), manager of the research field (Z. Gaile – 1993-2000; Mg.agr. J. Kopmanis – 2000-2005; Mg.agr. O. Balodis – 2006-2009; agronomist I. Zaika – from 1 April 2009), technician, and three to four laboratory assistants. For soil tillage and connected jobs, tractor operators of the production unit are hired.

Main research directions during this period were connected with field crop breeding, variety evaluation, investigations into forage crops, soil tillage and sowing technologies, and the Internet-based decision support systems for integrated pest management. Recently research is being performed with crops regarding possibilities of producing alternative energy, and in precision farming.

During the second research period (1999-2009), possibility of using lucerne in pure stand and in mixture with timothy for pastures and for making haylage as well as cutting frequency effect on stand longevity and forage quality were studied. The research showed that foreign lucerne varieties bred nowadays can be used intensively also under Latvia's conditions if cut 3-4 times per season (during five years, a good high-quality yield was obtained). Choice of defoliation times per season depends on fall dormancy rating of a variety and on agro-meteorological conditions of the season (Gaile, Kopmanis, 2004). Growing lucerne in mixture with timothy gave higher yield, but pure lucerne stand provided higher crude protein content. If lucerne is planned to use in pastures, special purpose varieties should be sown (e.g. 'Karlu') (Gaile, Kopmanis, 2006).

Maize was investigated within a co-operation program with the Scientific and Production Farming enterprise "Company "Maize"" from Ukraine. The results confirmed the possibility of obtaining energetically dense silage from maize in Latvian conditions and for the first time showed the importance of the effect of the sowing and harvesting time on the yield amount and quality (Gaile, 2004). Further research on maize sowing and harvesting time was carried out by Dr.agr. Z. Gaile during 2005-2008. The obtained results showed that the best sowing time is the 1st ten-day period of May, and the best harvesting time depends on the maturity of maize – most frequently after 20th September or even in early October (Gaile, 2008b; 2008c). Also fertilization and weed control in maize was studied, and the conclusions were published in popular scientific journals for use of Latvian farmers. The recent studies (since 2008) on maize are connected with its use as a biogas substrate (Gaile, 2008a). These investigations are of high importance for the farm itself as well as for Latvian agriculture in general. A doctoral student under the guidance of Dr.agr. Z. Gaile is attached to these studies. "Vecauce" now is the only place in Latvia where maize is studied in detail.

Starting with 1999, the breeding nurseries of barley and winter wheat managed by Dr.biol. I. Belicka were relocated from the research farm "Pēterlauki" to "Vecauce". I. Belicka carried out a study according to the grant of the LCS, and later – a collaboration project in plant breeding also sponsored by LCS. Within this grant, part of the research "Agro-biological evaluation of hulless barley and its breeding perspective" was carried out by L. Legzdīņa for earning her Dr.agr. degree. The theses were defended in 2003, and the main conclusion was that initiation of a hulless barley breeding program in Latvia is useful. L. Legzdīņa also analysed the yield potential and the main positive and negative traits of hulless barley, and worked out selection criteria and main tasks for the breeding program (Legzdīņa, 2003).

Another group of researchers, which very intensively started research in 1998, was the whole staff of the Field Management Department under leadership of professor D. Lapiņš. Initially, different soil tillage and sowing technologies for spring barley and winter wheat were studied. Four different soil tillage modes were used (traditional mould board ploughing, ploughing very shortly before sowing, ploughing very shortly before sowing together with use of soil under the layer packer, and without ploughing). Also 4-5 different sowing technologies were used per every soil tillage treatment. The researchers found out that direct drilling and minimal soil tillage used in well-cultivated clay loam soils guarantee the same yield level as traditional soil tillage with mould board ploughing and at the same time provide economy of money. Use of soil under the layer packer and local fertilizing together with sowing was effective for winter wheat. Used sowing technology has less effect on high barley yield formation if compared with soil tillage technology and agro-meteorological conditions (Lapiņš et al., 2001). Later, a group of Field Management Department performed another research project connected mainly with soil tillage, sowing manner and weediness effect on cereal yield formation.

Weed control problems were studied for integrated pest management system as well as for organic farming. J. Kopmanis, under guidance of Dr.agr. M. Ausmane, carried out a research on weed control problems for earning his Dr.agr. degree – "Effect of reduced herbicide dosage on weediness of spring barley and on next generation of weeds". The research included investigation of reduced dosage (treatments – control without herbicide use, 1/1, 1/2, and 1/4 from the registered dose) effect on weed control of six widely used herbicides for spring barley. Based on adopted herbicide efficiency for different weed species control, prototypes of "PC-P Weeds" (originally created in Denmark) computer program for Latvia was made, and the next generation of sprayed-with-reduced-herbicide-doses *Chenopodium album* was studied according to possible resistance development (Kopmanis, 2005). In 2004, Dr.agr. M. Ausmane started to study weed control problems in organic crop rotation after certification of the organic research field and establishment of crop rotation. The research demonstrated that crop rotation reasonable in organic farming system is one of tools for weed control thanks to different cultivation technologies that are used for different crops. Crop species diversity and crop diversity according to utilization in rotation can control spread of weed seeds. For *Elytrigia repens*, special agro-technical methods should be used, but annual and biennial weeds can be effectively controlled by harrowing (Ausmane et al., 2007).

Currently investigations of field crop management are carried out in precision farming under guidance of Dr.agr. D. Lapiņš. For this purpose, several production fields are used; the main winter crops investigated are wheat, barley, and oil-seed rape. In the investigations two doctoral students are participating and carrying out their research for earning their Dr.agr. degree.

The researchers from the Plant Protection Department (Dr.habil.agr. I. Turka and Dr.biol. B. Bankina) carried out part of research for the international project "Development and implementation of an Internet-based decision support system for integrated pest management in Latvia", subsections NegFry (connected with *Phytophthora infestans*) and "PC-P Diseases" (connected with winter wheat diseases) (1999-2002). Both models like "PC-P Weeds" were created in Denmark. The main conclusion was that use of the programs can decrease the number of sprayings or the total amount of used pesticides. Within this project, G. Bim teine under guidance of Dr.habil.agr. I. Turka carried out a research with field trials for earning her Dr.agr. degree – "Inventory of *Phytophthora infestans* population and optimisation of computer models for forecasting" (Bim teine, 2005).

Since 2006, oilseed rape including incidence and severity of the diseases has been studied. Particularly attention has been paid to rape *Phoma* stem canker (*Leptosphaeria* ssp.). Development cycle of disease and diagnostics of two agents (*Leptosphaeria maculans* and *L. biglobosa*) in Latvia has been studied (Bankina et al., 2008). The research on disease control of oilseed rape is being continued, and also control of cereal diseases for integrated pest management is currently being studied.

The Department of Plant Biology has not carried out big-scale experiments in "Vecauce". Some demonstrations of the efficiency of nitrogen fixing bacteria use for *Galega orientalis* and lucerne have been performed under guidance of professor V. Klāsens. Demonstrations clearly showed necessity to use nitrogen fixing bacteria, especially for new or seldom grown crops (such as *Galega orientalis*) due to non-being of specific bacteria in soil. Also the Department of Horticulture has not extensively made use of the "Vecauce" orchards for research. Some bachelor studies have been carried out there. For example, a very nice project was realised for the exhibition "Vecauce-2004" – arrangement of a small garden of spices and vulnerary and ornamental plants. The garden is being renovated and rebuilt in 2009.

The Department of Soil Science and Agrochemistry made use of the "Vecauce" facilities infrequently. Three standard profiles of the "Vecauce" soils were described in 2002, and the results of two descriptions were included into the newly published (2009) "Taxonomy of Latvia Soils" (in Latvian "Latvijas augšņu noteicējs") edited by professor A. Kārklīņš. In 2007, Dr.agr. R. Vucāns arranged a couple of field trials in order to develop a new method of phosphorus detection in soils; in 2008, Dr.agr. I. Līpenīte studied use of dairy cow manure as a substrate for biogas production, and use of digested substrate for fertilization of field crops.

Investigation into different topics connected with oilseed rape was started in 2006. The growing manner of winter oilseed rape has been studied by surveying 15 farms in Zemgale. Field trials have been arranged in "Vecauce" for testing the efficiency of foliar

fertilization and the disease control methods (Balodis et al., 2008), and lately also the influence of sowing time and sowing rate on the formation of winter rape yield. The last research theme is included in the study of vice director for research work O. Balodis for earning his Dr.agr. degree under guidance of Dr.agr. Z. Gaile.

These are only some of the researched topics. Besides them, a lot of field crop varieties have been tested in conventional and organic farming system according to the contracts concluded with the seed selling companies and the State Plant Protection Service (Official Test of Value for Cultivation and Use in organic conditions). Also plant pesticides have been tested according to the order of pesticide selling companies. Every year these results are demonstrated during the field days and seminars for farmers at "Vecauce".

Although "Vecauce" provides services for the whole LLU, all research activities are connected mainly with the Technical Faculty and Faculties of Agriculture and Veterinary Medicine.

The Department of Environment and Water Management has been carrying out monitoring of agriculture run-off in Latvia since 1996, and "Vecauce" is involved into this program as one of its research objects. The monitoring program is included into national and international research projects. The different monitoring projects have been headed by professors P. Bu manis and V. Jansons. Important for the development of the farm was the study "GIS application for management optimising of amelioration systems at RSF "Vecauce"" (2006), which was carried out by A. Dzilna for earning her MSc. degree.

Up to 1990, the Faculty of Economics extensively made use of the "Vecauce" facilities for bookkeepers training, but later in the survey period (1990-2009) only some diploma and bachelor papers were written using the farm as a research base. These papers were generally related to the analysis of farm management or accounting body of "Vecauce". Topics were important for the farm only at a specific moment. Academician A. Kalniņš and Dr.oec. M. Peļše within the frames of an LLU internal project (2008) analyzed profitability of biogas production at "Vecauce".

The results of various investigations have been published in many scientific publications in Latvia and abroad. Also newspapers and TV sometimes report on topical events at "Vecauce".

Totally, during the survey period, researches for 12 Diploma papers, 30 Bachelor papers, 16 Master papers and 14 Doctoral theses have been carried out at "Vecauce" or at least partly at "Vecauce". Another six research projects for earning Dr.sc. degree have been started lately, and bachelor, professional and master students are involved in different investigations for writing their final papers.\_

### **Scientific and Practical Seminar "Harvest Feast in "Vecauce""**

Field days and seminars were organised on the basis of the research field every vegetation season, but seminars also in winter in the Vecauce Palace Conference hall. Farmers appreciate visiting the farm where they can learn about the best and newest crop varieties, peculiarities of growing technologies, etc. The necessary advice can be obtained from the staff of "Vecauce" or LLU and from the partners of commercial companies. One of most important seminars is "Harvest Feast in "Vecauce"" which is organized in the first Thursday of November yearly since 2001. Originally, such event was organized in 1957-1967 when students were living and studying at "Vecauce" for one year and were carrying out their research for diploma papers. Then the autumn was the time to show what was grown during summer and to make a party. Nowadays a new idea is given to the bygone event: in the first part, a scientific and practical seminar is organized with oral and poster reports on the main activities during the gone season, discussions take place, and displays from the rich harvests can be viewed and tasted. The second part is relaxation, songs, dances and games. The renovators of this event, now already traditional and awaited, were vice director responsible for research work of "Vecauce" Z. Gaile, professor D. Lapiņš, and associate professor A. Bērziņš. Each year the seminar has another motto related to the season's topical issues. Initially, the seminar was intended only for the staff of "Vecauce" and Faculty of Agriculture, with invitations sent also to the partners from commercial companies. Later, since 2004, researchers from other agriculture scientific institutions were invited to participate with their reports and yield exhibits. The seminar as an important event has been acknowledged by the Academy of Agriculture and Forestry Sciences where a summing-up of the research season of agricultural sciences is made. Since 2004, a small brochure covering an

overall description of the season, abstracts of all reports, and descriptions of the main operations and activities of every institution-participant has been published. The seminar differs from large-scale conferences with a specific feature: the main discussion is about the currently ended research season, but not about fully accomplished studies. The last "Harvest Feast in "Vecauce"" (in 2008) was dedicated to the 145th anniversary of agriculture education in Latvia (Ražas svētki ..., 2008).

The activities of RSF "Vecauce" have been presented to innumerable foreign and local delegations including Latvia's Presidents, representatives of the Parliament, the government, the Ministry of Agriculture, scientists of the Academy of Sciences and the Academy of Agriculture and Forestry Sciences, ambassadors of some foreign countries, e.g. USA, etc. To sum up, it can be said that RSF "Vecauce" with its old traditions and study and research facilities is a place for versatile student personality development.

### Conclusions

1. The Research and Study farm "Vecauce" of the Latvia University of Agriculture (established in 1921) is not a self-dependent research institution, but a research and study base for all levels of students and staff of LLU. Therefore development of all three interrelated operation directions of the farm – agricultural production, training of students and advisory work of farmers, and research – are important. Production indicators after 1990 declined, and were again noticeably raised up and stabilised starting with 2004-2005.
2. Since 1998, the study course "Practical Agriculture" in the amount of 1 CP is successfully realised at "Vecauce" for all 1st year students of LLU. During the studies and after graduation, students evaluate "Practical Agriculture" as well-organized and important not only for their professional carrier but also useful for life in general.
3. Continuous research with animals has been performed at "Vecauce" since its establishment in 1921. During the independent Latvia, diversity of animal species has sharply decreased due to economical reasons. At present, only problems of dairy and beef cattle breeding, feeding, keeping and medical treatment are studied. The researchers are interested to have all species of animals on the research farm, but it requires large amount of financing. Each step further in modernization of the cattle-shed provides better research possibilities for the staff and students of the Technical Faculty as well as Faculties of Agriculture, and Veterinary Medicine. The obtained research results have always been important for further development of the "Vecauce" herd and for development of animal science and production of Latvia.
4. The well-appointed field research was interrupted at "Vecauce" during 1967-1993. In 1993, renovation of the research field within a co-operative program with the USA Department of Agriculture was started. Mechanization problems of field trials were mostly solved starting with 1998 owing to another co-operation program with foreign partners (Nordrhein-Westfalen country in Germany). Up to now, credibility of the research results obtained in "Vecauce" has been re-established anew. Starting with 1999, the field research has significantly expanded and the staffs of the farm and LLU have been carrying out studies on different topics and with different field crops. At present the priority is research in precision agriculture and studies of different growing aspects of energy crops.
5. Two traditional events organized at "Vecauce" are well known among farmers, researchers, etc., and are acknowledged as useful and needed: the Agriculture exhibition in "Vecauce" (since 1995) for farmers, researchers, commercial companies, students, and country-side people, and the scientific and practical seminar "Harvest Feast in "Vecauce"" (since 2001) which summarizes the season's agriculture research results in Latvia.

### References

1. Ausmane, M., Gaile, Z., Melngalvis, I. (2007) The investigations of crop weediness in crop rotation of organic farming system. *Agronomijas Vēstis*, No. 10, 25-31.
2. Balodis, O., Gaile, Z., Bankina, B. (2008) Performance of winter oil-seed rape depending on some risk factors: winterhardiness and disease incidence. *Proceedings of the 5th UEAA General Assembly and the Associated Workshop "Renewable Energy Resources, Production and Technologies"*. Hera C., Hoffmann V., Rivza B. (Eds.) Riga, Zinatne, 46-53.



3. Bankina, B., Balodis, O., Gaile, Z. (2008) Diseases of oilseed rape – current situation in Latvia. *Journal of Plant Pathology*, Vol. 90 (2, Supplement). Proceedings of the 9<sup>th</sup> International Congress of Plant Pathology, Torino, Italy, p. 155.
4. Bergs, J. (1926) *Izmēģinājumu un praktisku darbu saimniecība Vecaucē pastāvēšanas pirmos 5 gadus*. Latvijas Universitāte, Lauksaimniecības fakultāte, 116 lpp.
5. Bimšteine, G. (2005) *Phytophthora infestans populācijas inventarizācija un prognozēšanas datormodeļu optimizācija*. Promocijas darbs Dr. agr. zinātniskā grāda iegūšanai. Jelgava, LLU, 124 lpp.
6. Dermanis, P. (1940) *Augkopības katedras darbības pārskats: Jelgavas Lauksaimniecības akadēmijas Lauksaimniecības fakultātes izmēģinājumu un prakses saimniecības Vecaucē darbības pārskats 1. IV 1926.–31. III 1939*. Jelgava, Jelgavas Lauksaimniecības akadēmija, 23 lpp.
7. Gaile, Z. (2000a) Investigation of Alfalfa Performance and Quality at Research and Studies Farm "Vecauce" (1993-1999). *Proceedings of International Conference "Collaboration on Plant Breeding in the Baltic Sea Region"*, Estonia, Jogeve, 218-225.
8. Gaile, Z. (2000b) Agrīno kukurūzas hibrīdu novērtējums. *LLU Raksti*, Nr. 2, 2-9.
9. Gaile, Z. (2000c) Agrīno kukurūzas hibrīdu kvalitāte. *LLU Raksti*, Nr. 2, 10-17.
10. Gaile, Z. (2000d) Performance and Quality of Corn Hybrids Grown in Two Meteorologically Contrary Years 1998 and 1999. *LLU Raksti*, Nr. 3, 73-81.
11. Gaile, Z. (2003) Evaluation of winterhardiness in lucerne in Latvian conditions using an accelerated test. *Grassland Science in Europe*, Vol. 8, 365-368.
12. Gaile, Z. (2004) Possibility to grow early maturity corn hybrids for energetically dense silage in Latvian conditions. Proceedings of the 4th International Crop Science Congress: [www.cropscience.org.au/icsc2004/poster/2/1/3/394\\_gailez.htm](http://www.cropscience.org.au/icsc2004/poster/2/1/3/394_gailez.htm) – Accessed on 26 March 2009.
13. Gaile, Z. (2008a) Impact of some agro-meteorological factors on maize (*Zea mays* L.) biomass production. *Proceedings of the 5th International Workshop of UEAA "Renewable Energy resources, Production and Technologies"*. Hera C., Hoffmann V., Rivza B. (Eds.) Riga, Zinatne, 95-102.
14. Gaile, Z. (2008b) Quality of forage maize (*Zea mays* L.) depending on sowing time in Latvia. *Grassland Science in Europe*, Vol. 13, 459-461.
15. Gaile, Z. (2008c) Effect of harvest timing on maize (*Zea mays* L.) quality. *Proceedings of "21st International Grassland Congress, 8th International Rangeland Congress"*, Volume II. Edited by Organizing Committee of IGC/IRC Congress, Guangzhou, China. Guandong People's Publishing House, p. 703.
16. Gaile, Z., Adamovich, A. (2002) Evaluation of Alfalfa varieties grown in pure stands and mixtures. *Grassland Science in Europe*, Vol. 7, 410-411.
17. Gaile, Z., Belicka, I. (1998) Izlases kritēriji miežu 'Klinta' sākotnējās sēklkopības audzētavās. *LLU Raksti*, Nr. 14 (291), 23-32.
18. Gaile, Z., Kopmanis, J. (2004) Harvest management effect on productivity and forage quality of ten lucerne varieties. *Grassland Science in Europe*, Vol. 9, 924-926.
19. Gaile, Z., Kopmanis, J. (2006) Qualitative changes of lucerne and mixed lucerne-thymothy swards during the time of usage. *Grassland Science in Europe*, Vol. 11, 276-278.
20. *Jelgavas Lauksaimniecības akadēmija. Organizācija, apmācības, zinātniskā un audzināšanas darbība*. (1941) Latvijas PSR Izglītības Tautas komisariāts, Jelgava, Jelgavas Lauksaimniecības akadēmija, 47 lpp.
21. Kopmanis, J. (2005) *Herbicīdu samazinātu devu ietekme uz vasaras miežu sējumu nezāļainību un nezāļu nākošo paaudzi*. Promocijas darbs Dr. agr. zinātniskā grāda iegūšanai. Jelgava, LLU, 121 lpp.
22. Lapiņš, D., Bērziņš, A., Gaile, Z., Koroļova, J. (2001) Soil Tillage and Sowing Technologies for Spring Barley and Winter Wheat. *Proceedings of the 1st International Conference of BSB of ISTRO & Meeting of Working Group 3 of the INCO – COPERNICUS Concerted Action on Subsoil Compaction. Modern Ways of Soil Tillage and Assessment of Soil Compaction and Seedbed Quality*. Tartu: EAU, Estonia, 150-160.
23. *Latvijas Lauksaimniecības universitātes mācību un pētījumu saimniecības „Vecauce” darbības nodrošināšanas mērķprogramma 2004.-2006*. (2004) Jelgava, LLU, 48 lpp.

24. *Latvijas Lauksaimniecības universitātes Valsts mācību un pētījumu saimniecības „Vecauce” darbības nodrošināšanas mērķprogramma.* (1998) Jelgava, LLU, 21 lpp.
25. *Latvijā audzējamo produktīvo dzīvnieku un mājputnu izkopšana, izmantojot pasaulē aprobētas selekcijas metodes. Programmas pētījumu materiāli.* (1998) Nudiens J. (sastādītājs). Sigulda, LLU Zinātnes centrs „Sigra” un Privatizējamā Valsts Lopkopības izmēģinājumu stacija „Latgale”, 27 lpp.
26. *Lauksaimniecības zinātne Latvijā 1950.-1990. senioru skatījumā.* (2000) Bērziņš E. (sastādītājs). Jelgava, Latvijas Lauksaimniecības universitāte, 220 lpp.
27. *Legzdiņa, L. (2003) Kailgraudu miežu agrobioloģiskais vērtējums un selekcijas perspektīvas.* Promocijas darbs Dr. agr. zinātniskā grāda iegūšanai. Jelgava, LLU, 123 lpp.
28. *Pēteris Rizga dzīvē un darbā.* (1985) Āboliņš J. (sastādītājs). Rīga, Zinātne, 174 lpp.
29. *Produktīvo dzīvnieku un mājputnu šķirņu izkopšanas mūsdienu zinātniskie aspekti.* (1999) 16. nodaļa grāmatā: *Latvijas lauksaimniecības zinātniskie pamati. Zinātniska monogrāfija.* V. Strīķis (galv. redaktors). Jelgava, LLU, 16.1-16.73 lpp.
30. *Ražas svētki „Vecauce 2008”: Lauksaimniecības izglītībai Latvijā – 145 gadi. Svētku programma un referātu kopsavilkumi.* (2008) Gaile Z., Lapiņš D. (sastādītāji). Jelgava, LLU, 45 lpp.
31. *Rezevska, S., Brencis, K., Cjukša, L. (1954) Vecauce. Latvijas Lauksaimniecības akadēmijas Mācību un pētījumu saimniecības sasniegumi un pieredze lopkopības celšanā.* Rīga, Latvijas Valsts Izdevniecība, 106 lpp.
32. *Vecauce. Ar Darba sarkanā Karoga ordeni apbalvotās Latvijas Lauksaimniecības akadēmijas mācību un pētījumu paraugsaimniecība “Vecauce”.* (1981) Timšāns S. (sastādītājs). Rīga, Avots, 93 lpp.