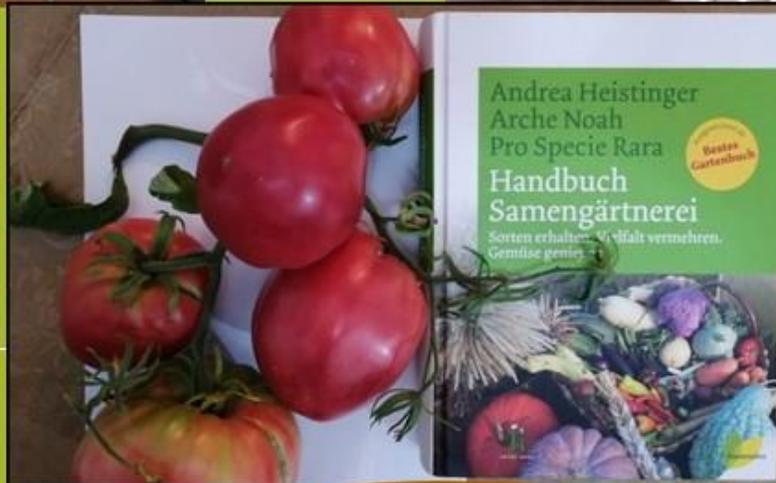


"Managing Plant Genetic Diversity for Food and Agriculture in Macedonia"



COMMUNITY SEED BANK ACADEMY

Report from stakeholder workshops held in several places in Macedonia in the framework of the Project.

July - November 2019



ACKNOWLEDGEMENTS

All workshops and sessions on which this report is based was organized by FABIA CSB, Bogdanci, Macedonia, on behalf of the ProSpecieRara project "Managing Plant Genetic Diversity for Food and Agriculture in Macedonia".

It was conducted in collaboration with the:

- Faculty of Agriculture "Goce Delchev" Stip,
- Department for Seed and Planting Material from the Ministry of Agriculture,
- as well as the NGO "Zelenata Arka" from Skopje.

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We would like to thanks to all partners that participated in the workshops, providing information about their work and background, providing inputs, sharing their views and contributing to the discussions on the opportunities of the CSB in Macedonia.

Abbreviations:

- **Arche Noah (A.N.)** – Austrian foundation for preserving and developing the diversity of cultivated plants. <https://www.arche-noah.at/>
- **CSBA** – Community Seed Bank Academy <https://academy.communityseedbanks.org/>
- **Faculty of Agriculture** in Strumica, University "Goce Delchev" Stip
- **FABIA CSB** – Macedonian civil association - implementer of the project activities.
"FABIA CSB" - Foundation of AgroBiodiversity in Agriculture – Community Seed Bank.
It is established in 2019 as an initiative of PSR and A.N.
- **MAWFE** – Ministry of Agriculture, Water and Forest Economy <http://www.mzsv.gov.mk/>
- **MPGDFA** – Managing Plant Genetic Diversity for Food and Agriculture in Macedonia
- **ProSpecieRara (PSR)** – Swiss foundation for preserving endangered livestock breeds and crops from extinction. <https://www.prospecierara.ch/de/stiftung/stiftung>
- **PGDFA** – Plant Genetic Diversity for Food and Agriculture
- **SME** – Small and medium enterprises

Workshop and lectures agenda

DATE	THEMES	ORGANIZED BY
SEASONAL	Seed propagation techniques Seed collection and results	Field trips by: Ljupcho Vasilev and Prof. Fidanka Trajkova in Strumica region
11-13.11.2019	Autochthonous varieties and their importance for sustainable food production	Dean Prof. Dr. Ljupcho Mihajlov
	Gene Bank Strumica – importance of regeneration, propagation and conservation	Prof. Dr. Dragica Spasova
	Garden crops in a protected area, with special emphasis on pepper selection and cultivation, as well tackling climate change in a protected area	Dr. Dario Danoevic, Novi Sad - Serbia
	Pepper production in a protected area	Field trip in Hamsali – Strumica
	Climate change and agriculture in Macedonia	Prof. Dr. Fidanka Trajkova
26.11.2019	Autochthonous varieties and wild edible plants vs. climate changes	Ljupcho Vasilev in Skopje
05.12.2019	Community Seed Bank	Prof. Dr. Annika Michelson

Places of organized workshop and lectures

1. Faculty of Agriculture in Strumica

<https://www.google.com/maps/place/UGD+Training+Center+Strumica/@41.4421278,22.6625975,17z/data=!3m1!4b1!4m5!3m4!1s0x14a9fe5f01c648d7:0xcbb3c43240e8c5c9!8m2!3d41.4421278!4d22.6647862>

2. Horticulture company Hamzali – Strumica

<https://www.google.com/maps/place/Hamzali/@41.4829228,22.7392413,338m/data=!3m1!1e3!4m5!3m4!1s0x14aa02680d7ebea3:0x128a0eac78d4f79c!8m2!3d41.4970557!4d22.7494759>

3. Students home in the villages in Strumica

4. Kotur bar – Skopje

<https://www.google.com/maps/place/%D0%9A%D0%B0%D1%84%D0%B5+%D0%B8+%D0%A4%D0%B8%D0%BB%D0%BC+%D0%9A%D0%9E%D0%A2%D0%A3%D0%A0/@41.9945328,21.4272799,17z/data=!3m1!4b1!4m5!3m4!1s0x13541585e9c1ba25:0xa2ad2fecfe1dcc5!8m2!3d41.9945328!4d21.4294686>

WORKSHOP SUMMARY REPORT

Workshop training title:

- Importance of Plant Genetic Resources for Food and Agriculture in Macedonia

Practical training subject on field:

- Demonstration of breeding & propagation techniques in front of students from the fourth year
- Seed multiplication and variety assessment in CSBs

Theoretical training subject:

- Autochthonous varieties and their importance for sustainable food production
- Gene Bank Strumica – importance of regeneration, propagation and conservation
- Garden crops in a protected area, with special emphasis on pepper selection and cultivation, as well tackling climate change in a protected area
- Climate change adaptation and agriculture in Macedonia
- Autochthonous varieties and wild edible plants vs. climate changes
- Community Seed Bank management and sustainability

Number of participants:

Participants/Facilitators:

- Mr. Vasilev Ljupcho, Project coordinator, Project coordinator and propagator, Bogdanci
- Ms. Fidanka Trajkova, professor at University “Goce Delchev” - Faculty of Agriculture, Strumica, Department of Plant Biotechnology
- Mr. Ljupcho Mihajlov, Dean and professor at University “Goce Delchev” – Faculty of Agriculture, Strumica, Department of agriculture and organic crop production
- Ms. Dragica Spasova, professor at University “Goce Delchev”- Faculty of Agriculture, Strumica, Department of Agriculture crop production and Gene Bank
- Ms. Liljana Koleva-Gudeva, professor at University “Goce Delchev”- Faculty of Agriculture, Strumica, Department of Plant Biotechnology
- Ms. Daniela Dimovska, professor at University “Goce Delchev” – Faculty of Agriculture, Strumica, Department of Vegetable crop production
- Mr. Ivan Donev, Manager at “Uni Servis Agro”, company for Seed production and multiplication
- Mr. Dario Danoevich, Research Associate at Institute of Field and Vegetable crops, Novi Sad – Serbia,
- Mr Dimitar Samardziev, NGO “Zelenata Arka” Skopje and propagator, Skopje
- Ms. Annika Michelson, Senior lecturer at HAMK University of applied science Finland
- 12 Students from fourth year at the University “Goce Delchev” – Faculty of agriculture Strumica

Summary of the sessions

After the first workshop, and the inability to develop a network of all stakeholders, who will attend the training and exchange sessions, a completely new framework of workshops took place. All of these trainings were held in front of the fourth year students of the Faculty of Agriculture in Strumica. The main idea of these trainings was to develop a win-win model, where the (I) students will obtain their teaching credits and practical experience, (II) Gene Bank seed regeneration and (III) project itself data and seed for the Community Seed Bank purpose.

Following the presentation of the project, the focus of the following activities was to take concrete steps on (I) different breeding and breeding techniques (II) seed multiplication by the Bank of Gen in Strumica, (iii) the importance of indigenous varieties for organic production in Macedonia (IV) climate change adaptation (V) Community seed bank management and sustainability. All of the above-mentioned activities and lectures were organized in two directions, i.e. theoretical and practical.

Primarily 18 students were initially registered for seed propagation as part of their obligatory practical work, from which 12 of these students have successfully completed their activities. Due to the delayed start of the activities with the students from the Faculty of Agriculture, out of 58 populations, only 24 were successfully propagated, while the other populations were again returned in the Gen Bank in Strumica.

Besides the practical activities, the workshops with the important topics within the project were a part of a class for the whole semester. It's were organized five workshops as a part of the semester, as well as one session in Skopje in front of enthusiasts and maintainers of local landraces.

Key message

The entire project came across positive assessments by all attenders. The method of cooperation with the students was embraced. Besides this, the training and exchange sessions contributed to dialogue at a various theme, i.e. how can autochthonous varieties mitigate the climate change, how enthusiasts can mitigate the loss of the agrobiodiversity, the influence of the science to policy improvement.

The proper multiplication as a key for agrobiodiversity conservation contributed to the propagation of 24 populations by the students. At the end of the workshop, all of the participants obtained a certificate of appreciation from the Project and Community Seed Bank Academy.

➤ **The embraced model of maintaining PGDFA with academic institution in Macedonia**

**Students' activity from Faculty of Agriculture, Goce Delcev University – Stip within the project
“Managing plant genetic diversity for food and agriculture in Macedonia”**

All students at the Faculty of Agriculture are obliged to perform practical work of 30 days as part of their regular study curriculum. They receive 2 ECTS for this activity and without proof for practical engagement they cannot enroll the next academic year. We have certain a number of agricultural companies and agreement for collaboration where our students can do their practical work, but many times this type of engagement was proven to be nonfunctional from many points of view.

The project “Managing plant genetic diversity for food and agriculture in Macedonia” is an excellent opportunity for engagement of students to do easy-to-do practical work at home during the growing season in the country. The opportunity was even greater because most of the students are living in the county side and them with from small-scale farm background, so they have all needed conditions and skills to propagate plants and multiply seeds. Additionally, students are doing it at home without making travel costs to and from companies during their practical work. From supervising point of view, it's easier to follow and supervise students with specific task to do (sow and grow plants) and to produce specific result (seeds). Taking in consideration all above, the activity was started as a win – win for all involved parties.

For the purpose of the project, we engaged voluntarily 18 students from forth (final) year of studies because they have passed all the curriculum courses, thus the most trustful for the task. They received different number of local landraces for propagation. The landraces were provided from the genbank of the Faculty of Agriculture. The students receive information about the project aim and goals, as well as explanation about how to do their practical work, which written data/photos they have to collect during the practical work and they amount of seed they have to give back to the project and faculty genbank. The bottom line of instructions was that they have to do their practical work “from seeds to seeds”, accordingly they receive seeds and they have to give back seeds. The “Label information” sheet for collecting basic data from propagation process was distributed to them by email, as well as reminder for obligatory photographing each stage of plant propagation. If students will do this practical work with success it can be included as their project work for certain courses or/and final project (diploma project) for their graduation. Last but not least, involvement of young people in such a project is very important to motivate students to understand the importance of agricultural biodiversity via practical work and to be involved as part of community seed banks in the future.

Since 4th of July the project coordinator Ljupcho Vasilev and Professor Fidanka Trajkova have visit all students. Professor Fidanka Trajkova is in continues contact with the students, giving directions and advices how to do their tasks and to have positive results at the end of the season.

Practical training subject on the field

- Demonstration of breeding & propagation techniques in front of students from the fourth year
- Seed multiplication and variety assessment in CSBs

Why	- Exchange sessions for breeding and propagation techniques - Seed multiplication
How	Field trips
Whom	Ljupcho Vasilev and Prof. Fidanka Trajkova

Summary

The idea of organizing workshops throughout the whole semester supported by the CSB Academy was a great opportunity for the students of the fourth year to gain new practical and theoretical knowledge as well as experience. The first student-run activities began in July, with the following goals set:

- Defining of which genotypes will be propagated as well as their basic description.
- Spreading of the selected genotypes between the students, and presenting their tasks and activities.
- Presenting the results in a front of the involved parties at the end of the year.

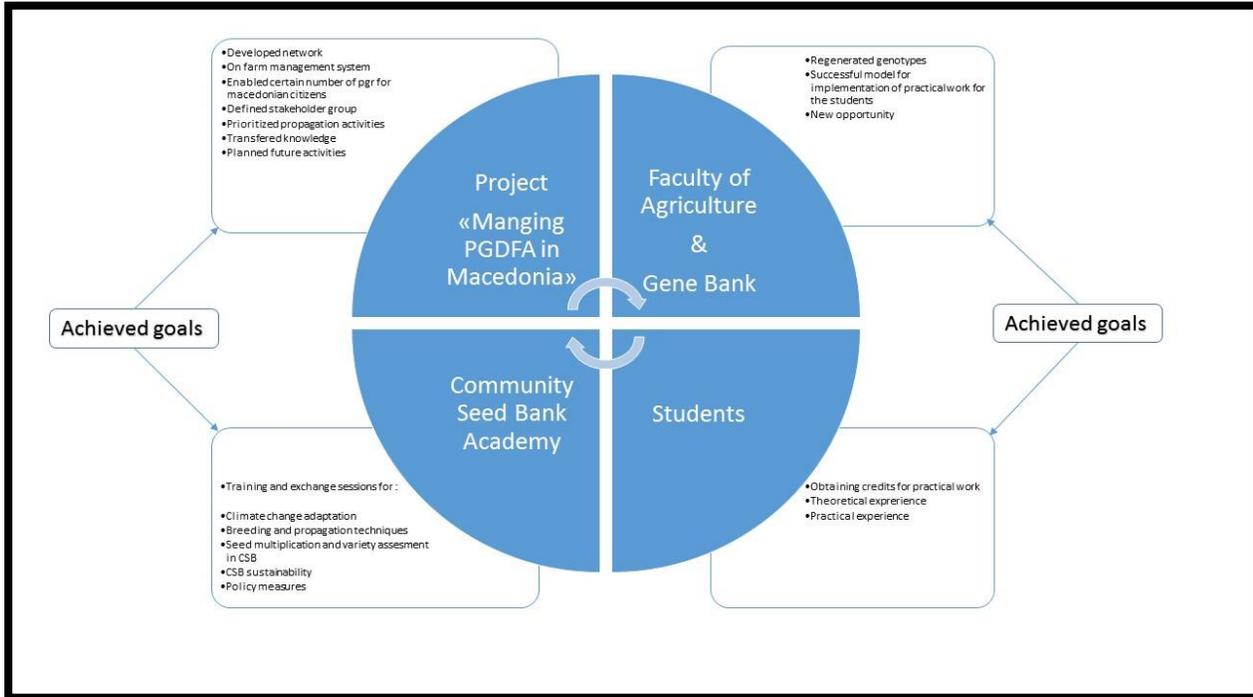
According to all feedbacks, the model (picture 1) has satisfied all involved parties in the project. The benefits for the Faculty of Agriculture and the Gene Bank are a regeneration of certain genotypes from their Gene Bank as well as a model for practical work of their students. The student's benefit are obtaining the necessary credits from practical work, practical experience in conserving plant genetic diversity and engaging in the project activities. In order to be able to obtain the necessary credits, in addition to the reproduction of genotypes, the students had to meet the following goals:

- A basic description of the given crop/genotype: (in two-leaf stage; in flowering stage and in a fruit stage). Besides a data, the students must procure as well photos.
- A brief summary for the crops i.e. for what are used now and in the past.
- Diseases and pests: which disease or pest face during the cultivation.
- The ways of cultivation and place of cultivation.

Throughout the whole vegetation period, all students were visited repeatedly by us, where besides the monitoring, were presented breeding and propagation techniques for:

- Place of placement of the given crop for the preservation of the genetic;
- Control pollination and proper breeding

All of these information were presented at the closing ceremony, where they were awarded with certificate of appreciation in the project.



(picture 1) A pilot model for achieving the established goals

Theoretical training subject:

The theoretical part covered the following topics, which are closely related to the activities of the CSB:

- Autochthonous varieties and their importance for sustainable food production
- Gene Bank Strumica – importance of regeneration, propagation and conservation
- Garden crops in a protected area, with special emphasis on pepper selection and cultivation, as well tackling climate change in a protected area
- Climate change adaptation and agriculture in Macedonia
- Autochthonous varieties and wild edible plants vs. climate changes
- Community Seed Bank management and sustainability

Why	Raising public awareness of the importance of the PGR from Macedonia as a mitigator of the climate change
How	Lectures and Training sessions
Whom	Dean Prof. Ljupcho Mihajlov; Prof. Fidanka Trajkova; Prof. Dragica Spasova; Prof. Liljana Koleva-Gudeva; Mr. Dario Danoevich; Mr. Dimitar Samardziev; Ms. Annika Michelson and Mr. Ljupcho Vasilev

- Autochthonous varieties and their importance for sustainable food production

To demonstrate the importance of the autochthonous varieties as well as the initiatives of the project, the Dean and Professor Ljupco Mihajlov has presented the (ppp 1):

- definition for autochthonous; old varieties; landrace
 - importance of the agrobiodiversity for sustainable food production
 - outputs from agrobiodiversity loss
 - principles for organic agriculture
 - effects from organic agriculture
 - characteristics and meaning of the autochthonous species and varieties
 - few data examples from old and modern varieties
 - conclusion and recommendation
-
- Gene Bank Strumica – importance of regeneration, propagation and conservation

After the presentation for the importance of the PGDFA by the Dean, the session was chaired by Professor Dragica Spasova from the department of Agriculture crop production and responsible for the Gene Bank.

The Gene Bank Strumica is established in 1972 as part of the former Agricultural Institute for Cotton in Strumica. Since then, the employees at the institute has been collecting PGR from different locations in the country. Thanks to the integration of the Agricultural Institute with the Faculty of Agriculture "Goce Delchev" Stip, the Gene Bank remained operational. According to Ms. Spasova, in Macedonia are three Gene Banks in:

- Institute of Agriculture - Skopje
- Tobacco Institute - Prilep and
- Faculty of Agriculture Stip, teaching centre Strumica (which is an active and working collection of field and garden crops)

All reference varieties are presently stored in the Gene Bank in Strumica. The collected materials at the Gene Bank are kept at 0-5 degrees. The last regeneration of the Plant Genetic Material was in 2010. Often the regeneration of the Plant material was done by the master students.

The Faculty also posses a storage room for collections up to -18 degrees, for a basic collection, but unfortunately, they have no financial support from the relevant institutions. According to the professor, the last finance contract for the Gene Bank with the MAFWE was made in 2013, which lasted two years.

The Gene Bank has an own collection of cotton and sesame seeds, which has been collected in 1972. Nowadays these crops, unfortunately, are disappeared from the Macedonian arable land. Besides these, the Gene Bank has Seed material from Soybean, Pepper, Tomato, Beans, Corn etc.

The fact that in Macedonia it is not easy to bring people on one table, from different institutes and different regions, proves that the 2016 meeting did not produce any positive results. In 2016 was convened an official meeting with all stakeholders (MAWFE, Faculty of Agriculture Skopje, Agriculture Institute, Tobacco Institute Prilep and Faculty of Agriculture Stip). The purpose of the meeting was to form

a national Gene Bank, where the basic collection material of all Gene Banks in Macedonia will be kept. Unfortunately due to a dispute between the Agriculture Institute Skopje and the Faculty of Agriculture in Skopje about the location of the National Gene Bank.

However, in the end, Professor Spasova thanked the project "Managing PGDFA in Macedonia and the CSB Academy, for the opportunity to be restored various genetic materials from sesame, tomato, pepper, beans, corn, lentil and sunflower as well as the chance for the students to obtain new experience.

- Garden crops in a protected area, with special emphasis on pepper selection and cultivation, as well tackling climate change in a protected area

The lectures held by the Dario Danojevic were of great importance for the students. On Monday the 11th of November, Dario Danojević had three presentations. The first was about "preventive measures in vegetable production" generally with the accent on preventive measures in a greenhouse. He emphasized the importance of organic fertilization, seed disinfection, the use of antiinsect nets...

The second one was "pepper growing". In that presentation, he spoke about the optimal temperature, plant distance, fertilize recommendation, growing models in a greenhouse, and most important pathogens for pepper, appropriate fruit handling during and after harvest. Also, he mentioned the importance of marketing and geographical indications.

Pepper breeding was the third presentation. In that subject, Dario was told about the most important fruit traits for breeding, crossing methods, selection methods, and types of flower sterility in pepper.

He presented several examples from his research about resistance breeding and breeding for quality. Also, he showed the new pepper varieties from Institute of Field and Vegetable Crops.

On Tuesday, Dario had presentation about the characteristics of different greenhouse types and climate change. He showed several trends for temperature and the amount of precipitation in Serbia, and some examples of severe weather on greenhouses in Spain, Turkey, and Macedonia.

- Climate change adaptation and agriculture in Macedonia

Today the global challenge "Climate change" that has no borders and it requires coordinated work, takes also place in our workshop as well. A presentation about climate change was chaired by Professor Fidanka Trajkova. She started with basic information about Macedonian agriculture, average temperature and rain. After the inputs about the country, she focused on the effects of climate change on the agriculture in Macedonia (ppp 2). The focal points were the yield decrease as a result of climate changes presented in percentage. However, she pointed out a few measures for climate change mitigation as such as genetics and breeding measures; irrigation improvements; fertilization based on agrochemical analysis; crop rotation; soil conservation; raising public awareness etc.

- Autochthonous varieties and wild edible plants vs. climate changes

The development of a sustainable network of different stakeholders through the "Managing PGDFA in Macedonia" contributed to another workshop for the maintainers and supporters held on 26.11 in Skopje. The NGO "Zelenata arka" from Skopje invited us as lecturers on the theme "Autochthonous varieties and wild edible plants vs. climate changes".

The above-mentioned theme is a part of the project "Let's Talk About Climate Change" implemented by Eco-sense, CNVP Macedonia and DEM, funded by the European Union.

Talking about autochthonous and local varieties and wild plants, the audience has found that despite the accelerated loss of agrobiodiversity, some rare specimens still show satisfactory resistance to biotic and abiotic stresses. Therefore we need to identify as soon as possible the plant species with the most suitable properties for survival in disturbed living conditions, as a result of the destruction of ecosystems, soil degradation and climate change.

The general conclusion is that it is necessary to develop joint seed banks founded by citizens to support and co-operate with existing institutional gene banks in their efforts to preserve and maintain the diversity of seed plants.

➤ Community Seed Bank management and sustainability

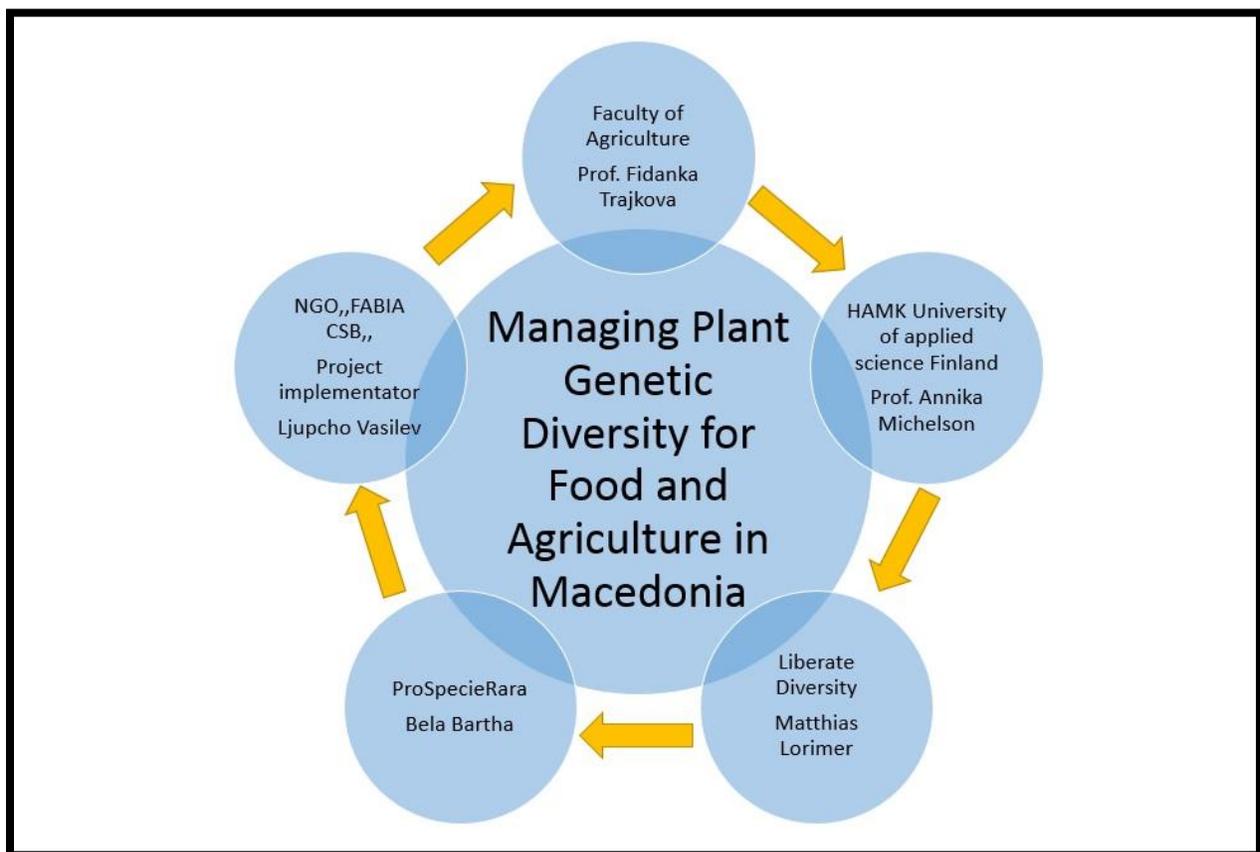
Given that in Macedonia has not been established a National Gene Bank, the Community Seed Bank is "unattainable" for us. With the implementation of the project "Managing PDGFA in Macedonia," first of all we faced misunderstandings and disagreements regarding the establishing of CSB. The biggest misunderstandings were in relation to (I) What is CSB, what does it mean (II) What are the benefits, what do I benefit from it and so on.

In order to alleviate these misunderstandings, and to obtain experience as well as to apply practices from another country on 5th December an online lecture was held by Professor Michelson (ppp 3). Thanks to the good connection with the Faculty of Agriculture she was very happy about this initiative. From the online classes, the students had the opportunity to learn deeply about the CSB and why we need to keep and grow the old plants. She shared the experiences of Finland related to the CSB in front of the students. According to her, this topic is extremely important for every student in the world. Finland has already developed a model for the conservation and promotion of the PGDFA. Apart from the FSB, as an important tool, they introduce their old varieties into agriculture and reduce the impact of climate change. By introducing these varieties they create better agricultural products and thus a good promotion of them.

Why the implementation of the Project activities is so difficult in Macedonia?

Many projects have been implemented in Macedonia to preserve genetic diversity. Unfortunately, due to the lack of cooperation between all the actors and the non-involvement of all actors, so far all projects have been more or less unsuccessful. By implementing the project, we are also faced with the inability to connect or delayed connections between all actors. The following figure shows the way the project implementer connects with the Faculty of Agriculture in Strumica, with whom we have successful cooperation with visible results.

How the connection was set up?



The chain of connection between the Faculty of Agriculture and the Project "Managing of Plant Genetic Diversity for Food and Agriculture in Macedonia"

Unfortunately, all of those misunderstandings and non-involvements and non-invitation of all important stakeholders may negatively impact on the conservation of the Macedonian Plant Genetic Diversity, which will be loose forever.

➤ Annex

Presentations (PPP) in English

- Autochthonous varieties and their importance for sustainable food production
- Climate change adaptation and agriculture in Macedonia
- Community Seed Bank management and sustainability
- Finland and agriculture
- Students presentation

Letter of recommendation from the Dean

Pictures and video material

<http://zf.ugd.edu.mk/index.php/mk/vesti/88-predavanje-dario-danojevik>

Financial section (Budget)