Interreg NEXT Black Sea Basin

Co-funded by the European Union

SeedGuard

BSB00450, SEEDGUARD: Seed Guardians for Biodiversity, Agrobiodiversity, Ecosystem Services and Climate Adaptation

Module 3. Review of good CSCs and CSBs practices in the World and Europe

Activity 1.3. Trainings “Guardians of the Seeds”

Interreg Co-funded by the European Union

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Preamble

„Of the world's 15 000 edible plant species, only around 150 are cultivated commercially" (Facciola, 1989) – most are perennials!

There is a lot to learn from the good practices for establishment and running the CSCs and CSBs all over the World. A few countries designed and implement measures for assisting farmers in access of plant genetic resources (PGR), of vegetable seeds particularly (good example: Scandinavia).

Different countries have different regulation on the matter. Study of good practices will help to elaborate approaches and mechanisms to get discussed with policy and decision makers in the project partner countries. The experienced practices in various places of the World can inspire collaborative efforts, based on the rural specifics, knowledge and needs of local communities, which are establishing and operating CSCs.

The good practices, exemplified by the research, also cover a few legal matters, the role of governmental institutions, collaboration with academia, cooperation and networking and making the topics, related to plant agrobiodiversity, widely acknowledged.

CSCs and CSBs work as seed vaults and an instrument to preserve and protect farmers' or indigenous rights in access to and using traditional seeds of heirloom vegetable varieties. They are engaged in participatory plant breeding and variety selection to support availability of seeds for resilient agrobiodiversity. The best scenario towards sustainability is to unite efforts of vegetable breeders, seed producers, farmers, researchers, local consumers and other actors. Agricultural, health and government agencies are advisable to approach as well, as they are designing the rules and policies.

This is how we start:

The main purpose of setting CSCs and CSBs is to provide community members with seeds. They are mostly voluntary, self-organised and self-managed and are considered

part of the informal seed systems, dealing with selection, conservation, exchange and sharing seeds.

As the good practices below demonstrate, the CSC's and the CSBs can be an effective way to improve access and benefit sharing of important plant diversity, of vegetables in particular.

CSCs and CSBs are sources for seed material to farming communities for exchange seeds in a decentralised way, but not only. All kinds of events, related to climate change, agricultural products and food are appropriate for promotion of heirloom vegetables and seeds to hobby growers and urban users.

In many countries, where the CSCs and CSBs are part of the seed breeding system, they initiate a policy dialogue for national regulation. In Brazil (Paraíba), for example, the distribution of seeds produced by CSBs was legalized without the formal certification by specialized agencies, which was required before. In India, the scientists suggested that the CSBs are integral part of the national seed policies.

The countries of the project partners, e.g. Bulgaria, Romania, Türkiye and Georgia are not active enough in establishing principles that will support officially the community seed systems and make them effective for family farmers and other relevant entities. With the exception of sporadically initiated projects ("Heritage Seeds" and "Farmers' Rights" in Bulgaria (2014-2017), the "Biodiversity for Food and Nutrition", BNF project in Türkiye, http://www.b4fn.org/), there were no evidences found of what so ever attempts at national level to encourage a local varieties' seed saving in the CSC or CSB format of farming communities of the project partner countries.

This brings into focus questions, such as: What are the main success factors and challenges of both formal and informal safe systems for family farmers? What lessons can be drawn from existing practices? What effective solutions can be developed to make the procedures less bureaucratic, with less legal formalities? How to really enhance access and benefit sharing for family farmers?

Good practices from the World outside Europe

Improving access to vegetable seeds for resilient family farms in Costa Rica

(Farming Matters Magazine Special Issue, Access and benefit sharing, BI and Centre for learning of sustainable agriculture, April 2016, www.farmingmatters.org)

In 2014, eight small coffee farmers in Costa Rica decided to experiment diversification with horticultural crops for food, in collaboration with two vegetable seed banks that allow farmers to use varieties freely under the multilateral system of FAO´s International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). They executed successful experiments with tomato and sweet pepper varieties. The results were very optimistic and the farmers were encouraged to gain access to horticultural crop genetic resources, as the basis for diversified farming systems that are more resilient in the circumstances of increasing dynamics of the climate and price volatility, thus securing food provision to people.

A similar approach has been taken by the members of the Bulgarian Pepper Association in 2015-2016. Bulgaria is traditionally well known for high quality pepper production of own varieties, both sweet and chilly, but specialized farmers eagerly looked for diversification with other vegetables and local landraces in order to provide diversity through their supply channels and attract more customers. They also wanted to achieve security in the case of a bad year in the production of a single mono-crop such as pepper.

The Costa Rica experiment with tomato and sweet pepper was led by the Tropical Agricultural Research and Higher Education Centre (CATIE). These crops were chosen for the experiment for the following reasons:

Farmers in the region have expressed strong interest in horticulture crops not only as the alternative cash crops complementary to coffee, but also for domestic consumption;

The CATIE's gene bank maintains highly diverse collections of these two crops, which provides the necessary variety for selection of interesting varieties, accessible under the multi-lateral system (MLS) established by FAO´s (ITPGRA). The fundamental economic principle was, that diversified farming systems are often ecologically and economically more resilient than those with less varieties of crops. Diversified farming makes producers' income more stable and provides variety of diet to people.

In many countries of Europe, farmers do not have access to quality seed material to diversify with crops, they want to grow.

The Costa Rica project improved the farmer's access to PGR and enriched practices in a resilient and sustainable manner.

The experiment was organized in the following way: eight farmers, four organic and four conventional, which expressed an interest to diversify with horticulture, were invited to participate. They experimented with three types of tomato and sweet pepper varieties: a popular commercial variety, a traditional variety from the CATIE's seed bank and a new variety that was developed by breeders from the World Vegetable Centre (AVRDC), assumed to respond to specific biotic and abiotic conditions in Central America.

Seeds from the CATIE's seedbank were ordered using the Standard Material Transfer Agreement (SMTA, developed by the International Treaty on Plant Genetic Resources for Food and Agriculture. Seeds of the AVRDC varieties (originating from Taiwan) were obtained by CATIE after signing a SMTA to test them in Central America. The commercially most common tomato and sweet pepper varieties were ordered from a local greenhouse.

After the seedlings were transplanted to each farm, plastic bands were installed as protective roofs above each variety. Conventional and organic seedlings were given to the producers along with a management guide that was used to ensure that the same management approaches were used at all farms.

Each farm was visited once a week from the time the transplant began in April 2015 until the end of the field experiments in November 2015. During the visits, the following data

was recorded: (a) morphological and evaluation data of each variety, (b) site characterization of each farm, (c) management evaluation of each producer, (d) climate data, (e) yield data, (f) participatory evaluations with the producers, and (g) individual interviews with the producers about their preferences.

Farmers' preferences resulting from evaluation of the experimental varieties

Many factors affected the variety preferences of each farmer, including the type of management used on the farm and local market factors as well as local biotic factors.

As a result, traditional (heritage) varieties were ranked by most farmers as number one, followed by the new variety and the commercial variety. One of the farmers declared a great interest in the new variety: "These new varieties also give us something new to sell. The local people want new kinds of vegetables, new options, but I never knew where to find the seeds. So I have started saving the seeds from the new varieties and I can now sow my own seedlings and produce these great vegetables again." – declared one of the farmers.

Seed banks and national policy in Brazil

(Farming Matters Magazine | Access and benefit sharing)

Access to traditional, heritage seeds and landraces are increasingly of interest of farmers, agribusiness and policy makers in Brazil. Like in Bulgaria (we are not aware about the situation in the other project partner countries), authorities decide which varieties are to be included in a national list for production and which are excluded. Farmer organisations and social movements in Brazil (in Paraíba) initiated a decentralised farmer- driven seed selection and distribution in new public seed policies. They established a new way for access to seeds and benefit sharing. This good practice is remarkable, as it can open similar perspectives in the current project partner countries.

Local farming that keeps agrobiodiversity resilient is crucial for livelihood of producers. Identification of local practices and vegetable varieties and landraces started in Paraiba region in 1996 already with local bean varieties. 67 varieties of beans with different qualities were identified during the time. A special attention was given to those, which are resistant to droughts and pests and have a good taste and are well accepted by the market.

A scheme to enhance diversity and food security and to inspire farmers to use PGR was designed and implemented. The farmers started storing seeds and exchanging them with the others, thus establishing a free circulation of the genetic material and the associated knowledge about each seed's variety. Even some local church organisations established seed banks in the drylands of Paraíba, which were very helpful in times of drought when crops were bad and farmers' own seeds were exhausted. The CSBs lended seeds to the farmers which they returned, with a small percentage increase, after their next harvest.

The local CSBs strengthened the security of the farming system based on improved access and availability of diverse and high quality seeds. A Seeds Providers Network was established as well, to support knowledge exchange of seed practices and agrobiodiversity conservation. This network linked 230 seed banks in 61 municipalities, covering 6,500 family farms in Paraíba.

The Seeds Network also became the space for initiation of policy changes in face of drought and other events, threatening the food supply. The state government donated stocks of seeds (conventional, though) as an impetus for communities to construct new seed banks.

The CSBs, on their side, persuaded the government to purchase local seeds from the farmers and transfer them to the CSBs, which then were distributing them to the farmers in need. When local varieties became formally recognised by the national government in 2003, largely as a result of pressure by the National Articulation for Agroecology, the door was opened to more progressive innovations in the government seed programme. One of the strategies of the Lula da Silva government to eliminate hunger was the Food

Acquisition Programme. In 2003, as part of this programme, the government helped farmers to produce and distribute local varieties that were free from transgenic and pesticides contamination. Seeds started to be were directly purchased from, and distributed to farmers.

The Paraiba case proved that the local CSBs can lead and should lead the process for maintenance of the rich biocultural heritage embodied in local varieties. The role of the state became to support and regulate the process for agrobiodiversity and the common good.

Unfortunately, most government seed programmes continue to give preferences to conventional commercial seeds. The consideration is usually, that the scientifically proven seeds work well under semi-arid conditions and that the CSBs cannot reach all the farmers with the desirable seeds. That is why, the CSBs should establish collaboration and cooperation with the scientific world (as the case in Europe with the NordGen and the national gene banks in many EU countries).

The Paraiba CSBs started collaboration with the Brazilian government's most influential agricultural research centers. This helped them become accepted by the academia and achieve legitimacy towards policy and institutional levels. The farmers took active role in the process by making comparison between local and conventional varieties.

In Paraiba, local varieties outperformed conventional varieties in all regions during the three years of the executed tests. Conventional varieties only yielded better in highly fertile soils with plenty of rainfall, which were exceptional conditions for family farmers in semi-arid regions. The varieties that performed best in a certain area usually originated from there. Local varieties were also producing more biomass, which is highly valued as animal feed. The tests showed that the seed storage facilities constructed by farmers, often using only local materials and no pesticides, were good enough for conserving seeds. Although the tests justified already existing knowledge about local seeds, the results of the experiments became scientifically recognized through them. In addition,

much was learnt, both content-wise and methodologically, from the interaction between farmers and researchers.

In a conclusion:

The case of Paraíba illustrated the four core functions of the CSBs: conserving genetic resources, enhancing the technical autonomy of family farmers, enhancing access to and availability of diverse local crops, and ensuring seed and food sovereignty. The protests of farmers, which took place in 1998/1999 against conventional seeds and the subsequent governmental action to bypass the formal seed laws further confirmed that the lack of enabling policy and supportive legal environment is most likely the greatest challenge that most community seed banks face.

The experiences also showed that the state can indeed play an important role in supporting civil society organisations (the CSCs) and their networks in the construction of the seed security systems that allow family farmers in semi-arid regions to build their own food and nutrition strategies and increase their resilience to climatic change. The Brazilian case demonstrated the importance of social mobilisation in enhancing the capacity for collective action in rural communities. It opened the way for a mutually beneficial national seed regime for farmers and the food security of the society as a whole. The Paraiba experiences of the CSBs in Brazil demonstrated farmer driven mechanisms that enhance access, diversity and seed security for food security. The farmers store their seeds and exchange them with other growers, spreading the PGR freely, together with the associated knowledge.

“Seeds of passion are those that are good, that adapt to our reality” – said one of the farmers, a member of the CSB, “and people are only passionate about what is significant.”

Where is Europe?

The EU countries, which lost their agrobiodiversity, are now working hard and try to consolidate all national actors – central institutions, science and research and farmers to gain vegetable PGR back as much as possible. This process is clearly seen in the northern European countries, e.g. Scandinavia, the UK, The Netherlands, etc.

CSBs are rapidly appearing in Europe, according to the conclusions of the EU Horizon 2020 project DIVERSIFOOD. It is assumed that there are close to 200 initiatives by now. Why is this happening? What is the motivation? Who are the initiators? How do these initiatives develop? What are their successes and failures, their strengths and weaknesses? What is needed to support the movement for the future? The questions were taken up in a comprehensive survey, executed by the DIVERSIFOOD.

A brief history of community seed banks in Europe

The community seed bank movement in Europe dates back to the 1980s, and was particularly strong in the South. The CSBs took different forms and functions, often with assistance from national, regional or international non-governmental organizations.

Originally, the core objectives were to conserve and maintain the diversity of the PGR and provide access for farmers who could not obtain the necessary seeds or propagating material through the formal seed sector. The CSBs of the South were often set on participatory principle of farmers for management and breeding of plant varieties and plant populations, as the grassroots initiatives of organizations of farmers or gardeners.

In the UK, a Heritage Seed Library of Garden Organic was established in 1975 and was probably the first seed savers initiative in Europe. Other seed saving networks were established in the 1980ies in the Netherlands, Austria, Switzerland, Sweden and

Germany, primarily among gardeners. In the 1990s, new initiatives took place in Ireland, Germany, the Czech Republic, Greece and Spain. The real growth of CSBs happened after 2000 and especially after 2005 in France, Spain, Italy and Greece.

Due to the size of the movement in Europe, and the fact that the CSBs maintain and make available a wide diversity of crop varieties and populations that could otherwise be lost, this movement became an important contributor to the conservation and sustainable use of crop PGR in Europe. Also – helping to implement the Plant Treaty by national governments.

It was especially impressive for us (the Bulgarian People and Nature association and the Center for Heritage Interpretation) to learn, during our visits to Norway and at the meetings, organized and held for us at the Norwegian ministries of Economy, Environment and Agriculture, with farmers and farmers' organisations (Heritage Seeds Network, The Norwegian Royal Gardens to the Palace of the Queen), the NGOs (Open Space initiative for urban agriculture in Oslo, the Oslo Bread Procession, etc.), as well as with the research organisations, including supra-national (NordGen) - that Norway has a long-term strategy, in which all the relevant institutions/ministries and other mentioned above actors have a clearly defined roles and responsibilities to bring back farming practices in old varieties of vegetables and fruits in a decade! So, that the Norwegian market becomes nearly 85% self-sufficient in not a too long time! With the exception of citruses and other agri-products, which could not be locally produced due to purely climatic reasons! Please, note that we are talking about a country with not enough rich soils and a tough climate!

The former socialist countries (and not only), where the project partners come from, are more relaxed, the CSBs movement is not yet not well structured and the initiatives for saving agrobiodiversity, specifically in vegetables, are sporadic. Our assumption is that this is because the traditional vegetable varieties and landraces are still grown in remote rural places of these countries and can be found on the markets. In Bulgaria, for example, there is a huge interest in vegetables and fruits, grown in small farms and heirloom

gardens. They are highly demanded and preferred in the shops, as well as the food products, produced from them, despite their higher price. There are specialized distributors to supply regularly a selection of such products to people, who can pay for an on-door delivery, which is rather expensive.

Pic. 1. Pic. 2. Producers of vegetable seedlings, Patalenitza, Pazardjik distict, Bulgaria. Source: CHI

Below, some national experiences will be shown.

Norway

The Norwegian activities within the field of plant genetic resources are based on national regulations and priorities and on international collaborations and agreements.

Norway takes part in collaborating initiatives of the UNFAO, and has endorsed its global plan of action for plant genetic resources (2nd global plan of action for plant genetic resources for food and agriculture, GPA2), from the FAO Commission on genetic resources for food and agriculture (CGRFA) in 2011. The action plan provides themes and advices actions to further global food safety and food security.

Acceding the Convention on Biological Diversity (CBD) from 1992, Norway is committed to the protection of its biological and genetic diversity, and ensuring the sustainable management of its national genetic resources.

Norway has ratified the International Treaty on Plant Genetic Resources for Food and Agriculture, ITPGRFA (The Plant Treaty). The Plant Treaty agrees on the special features of the crop plants of the world, and secures the possibilities for continuous exchange of genetic diversity for food and agriculture, to support maintenance and development of agricultural productivity in all countries.

Furthermore, Norway has adopted the Nagoya Protocol, which contributes to the regulation of access and benefit sharing when using genetic resources.

The national action plan for plant genetic resources reflects the themes and recommendations of the global plan of action, GPA2, and contributes to the implementation of the provisions and guidelines of the Plant Treaty and the Nagoya Protocol.

The Norwegian Genetic Resource Center has overarching responsibility for coordination of the national work within the field of PGR. Prioritized areas are mapping and surveying of diversity of relevance for food and agriculture, reporting on status and developments related to the diversity and information work about genetic resources.

“If you want to preserve the PGRs, eat the food produced from them…” – Asmund Asdal.

Pic. 3. Market of vegetable producers. Source: CHI

Branding of old varieties

The trademark of the Norwegian Genetic Resources Centre is PLANTEARVEN: a collective term for the diversity of Norwegian cultivated plants that are currently threatened, not very widespread or no longer included in commercial use. This plant material is adapted to Norwegian conditions, is of cultural-historical importance and is believed to be genetically unique. To stimulate information, commitment and measures to preserve and use Norwegian diversity, the PLANTEARVEN award has been established. The award is an appreciation for special efforts that promote the conservation and sustainable use of plant genetic variation and diversity in Norway.

PLANTEARVEN originate from Norwegian plant breeding or selections of genotypes suitable for Norwegian growing conditions. It is a unique gene pool in Norway of species that are found in Norwegian wild flora. PLANTEARVEN introduced plants that have been growing in Norway for a long time and are adapted to Norwegian growing conditions.

PLANTEARVEN takes care for conservation, descriptions, availability, etc., of the preserved plants and distributes seeds and plants. It performs relations with Norwegian public, provides advisory services, organizes calls for seeds and plant trips.

The PLANTEARVEN applies criteria for use of the trade mark. It has a registration form and provides List of approved plants and where they are produced, information about the plants; images, history, cultivation, availability, etc.

Criteria for the use of PLANTEARVEN:

• Plants belonging to ”The Plant Heritage” of Norway

• Documented history for the particular plant material back to at least 1940

• Plants are in production and available (at least soon)

Pic. 4. Pic. 5. Documentary of seeds. Source: CHI

Pic. 6. Pic. 7. Presentation of Norwegian practices. Source: Armund Asdal, NIBIO, NordGen, Svaltbard vault

MORE ABOUT NORWAY

Important objectives for Norway regarding Plant Genetic Resources

- Be part of sustainable global systems for conservation
- Easy access to PGR
- Equitable interactions between countries: north – south, developing – developed countries
- Fair benefit sharing to ensure access also in the future

Norway has strongly supported and invested in:

- Development of a Nordic solution for Nordic material (NordGen)
- International cooperation, e.g. the elaboration and implementation of ITPGRFA

Milestones for Norwegian PGR Policy

- NordGen / Nordic Gene Bank established 1979
- a regional genebank, five countries involved

- NGB merged into NordGen in 2008
- Conservation of seeds, documentation and databases

PGR in public domain

The statement is: ”All PGR in public domain, freely available for all uses” .. .. ”should be managed in accordance with ITPGRFA and other international agreements” (Kalmar - declaration 2003)

National program for PGR in Norway

- National Program for Conservation and Use of Plant Genetic Resources for Food and Agriculture (2001-2006)

Norwegian Genetic Resource Centre (from 2006)

- Programmes for animals, crops and forestry
- cross sectoral projects and duties (the Ministries of Agriculture, Environment, Economy and sectoral agencies are constantly coordinating their activities. They have a joint consultative and decision making body, which meets **ONCE** a month to look at small and bigger problems of the PGR and suggest preventive actions).
- could be expanded, e.g. wild, flora, microorganisms and fish genetic resources

National program for PGR acts

- According to the Global Plan of Action for PGRFA
- In situ conservation
- Ex site conservation
- Use
- Capasity building and public awareness

Duties in the national PGR-program

- Inventories and documentation of PGR in Norway
- Consider and accomplish conservation measures
- Provide material and contribute to increased use of genetic diversity
- Information and serving network of stakeholders
- Coordinate Nordic and international cooperation

Plant breeding

- Important part of PGR activities, will be even more important in future
- National plant breeding merged into Graminor AS in 2002
- Ltd owned by private companies and governmental institutions
- Governmental grants secure breeding in small crops

Breeding programs in:

- cereals (spring wheat, barley and oats),
- forage grasses (timothy, meadow fescue an Festulolium)
- clovers, (red and white clover)
- potatoes
- fruit (apple and plums)
- berries (raspberries, strawberries and cloudberries)

Conservation and use of PGR in Norway

• Cooperation and shared duties NordGen / national NGRC

- Mapping, registration and inventories
- Investigation / documentation of material
- Availability for users, distribution of material
- Information and policy, international cooperation

• NordGen: Seed gene bank, databases etc.

• National: Field gene banks, network of national stakeholders:

- Plant collection hosts, R&D institutions, NGO's etc.
- Users - from plant breeders to hobby gardeners
- Public information – (PLANTEARVEN = The Plant Heritage)

Plant collections / field gene banks in Norway:

Work with 22 host institutions about conservation, availability of material and information:

- Fruit varieties: 12 collections
- Vegetables and herbs: 3 collections
- Potato (tissue culture: 1 collection/ 90 varieties
- Roses: 3 collections
- Ornamentals: 8 collections
- Berries: 1 collection
- In-door plants: 1 collection

Pic. 8. Field collection of food varieties in Norway, Source: Asmund Asdal

Decentralized conservation system:

- Cooperation with 11 institutions
- Mandate varieties –201 Apples, 55 Pears, 51 Plums & 29 Cherries
- Local cultural heritage varieties included
- Two trees in two localities
- Search / calls for missing varieties
- Written agreement with the host institutions
- Web-information about varieties
- Plant disease control

Agreements with host institutions:

- Conservation of varieties
- Labeling, documentation and information
- Distribution of material
- In accordance with ITPGRFA / use of Hobby MTA and New Norwegian Biodiversity Act
- Reporting: Use, material distribution & public relations
- Plant disease control and complying The Food Act
- Economic compensation from NGRC
- Maintaining a Thematic network

As part of the Norwegian experience we can mention The Royal Norwegian Society for Development (Norges Vel), actively involved in the establishment of the Norwegian CSB. The goal of the Norwegian Community Seed Bank is to make available plant material on a larger scale for cultivation and research. Through it, Norges Vel promotes the use of old varieties for food, making them commercially interesting again. It provides

collaboration between producers and growers of Norwegian seeds, and runs the secretariat for the utility gene bank.

The Norwegian CSB was established as a cooperative in the fall of 2018 by farmers who want to preserve plant genetic material and ensure genetic diversity in Norwegian varieties.

Pic. 9. Plants in Norway. Source: Norges Vel

The Netherlands

Potato breeding in the Netherlands: successful collaboration between farmers and commercial breeders

The farming system related to the Dutch potato varieties is bringing together farmers and commercial growers in a unique way. The Dutch model integrates institutions as well thus facilitating the access to the PGR and financial benefit sharing.

The model is particularly relevant to smallholder agriculture in developing countries. It involves farmers in overcoming shortcomings in the formal plant breeding system. It is referred to as 'the hobby breeder model'. It is based on breeding by family farmers in their own fields.

The potato breeding collaborative model in the Netherlands is set in the context of a highly productive agricultural sector. Potatoes are grown by 45% of the Dutch arable farmers and cover more than 150,000 ha of Dutch agricultural land. Forty-six percent of this land is used to grow ware potatoes, 28% starch potatoes and 26% seed potatoes. With an average yield of 46.7 t/ha, Dutch potato yields are among the highest in the world. Approximately 70% of Dutch seed potato production is exported to be grown in diverse environmental conditions around the world and for different consumer markets.

The effectiveness of farmer participation in the Dutch potato breeding model in the Netherlands is illustrated by the share of the farmer selected varieties grown there. In 2009, 409 potato varieties were planted for seed potato production. Of these 409 varieties, 293 (almost 75%) have been bred in the Netherlands. Half of those Dutch varieties have been selected by 82 farmer breeders, covering 44% of the total area planted with seed potatoes. Many of the potato varieties have become top varieties. One example is the Spunta variety, which is grown on 12% of the area dedicated to seeds production. Another one is the Sylvana variety, which is quickly taking the market.

The partnership between commercial breeders of seeds and farmer breeders was and still is based on mutual dependency and benefit. The commercial breeding companies

need the experience and the expertise of the farmers, who introduce new varieties. The work of the farmers provides big commercial seeds breeding companies with a high quality and diverse selection capacity at a relatively low cost that involves minimal investment in labour and land. The principle of the farmers' work is "no-product/no-pay". Farmers can execute more crossings for potato breeding. At the same time, farmers get access to improved germplasms through commercial seed breeders. The introgression of resistance genes from wild species takes 15–20 years of extensive (back) crossing and selection, which can only be conducted by large commercial companies or by public funding. The independent farmer-breeders also depend on larger breeding programmes. The few independent farmer-breeders who still make their own crosses use existing commercial varieties as parental material and source of new genes.

The use of existing commercial varieties by those Dutch potato farmer breeders who make crosses themselves is allowed under the breeder's exemption in the Breeders' Rights Act (this exemption was under pressure from the proposed TTIP free trade agreement between the EU and the US), which states that breeders cannot market protected varieties from other companies but are free to use each other's varieties for commercial breeding purposes.

The financial/legal model of potato breeding is very interesting in the Netherlands as well. Initially, the farmer breeders received public incentive payments, premiums and awards for successful breeding results. These later developed into royalty payments which are now linked to plant breeders' rights. The payment is set on "no product/no pay"rule. A farmer-breeder who receives seedlings from one of the companies usually signs a contract defining the sharing of ownership, the benefits, and the costs of registration if they select a variety that will eventually be registered and marketed. Depending on the way responsibilities are shared, the varieties are registered for breeders' rights in the name of the farmer-breeder and/or the company responsible for trading and maintenance. The sharing of royalties for a marketed variety varies accordingly. Independent farmer-breeders tend to seek a private arrangement for the clone they offer with one of the trading

companies. Since their role in the development of the variety is usually larger or even independent of a commercial breeding programme, their share of the royalties can be considerably more than 50%. They can also opt to be the sole owner and license a trading company to propagate and commercialize their variety.

There are three success factors of collaboration of farmers and commercial breeders: the specific historical context of the Dutch agricultural sector in which public institutional support to private sector breeding stimulated the development of collaborative relationships, a high level of farmer-breeder expertise, and potatoes being a genetically diverse and usually vegetatively propagated crop. The importance of the potato crop for national food security and export earnings stimulated the potato sector to join forces with Dutch research and government institutions. Different forms of collaboration go back to the early 20th century, but the establishment of the Commission to support breeding and Research of new Potato varieties (COA) in 1938 was a landmark event. The COA played an important role in coordinating and supporting developing potato breeding systems in the Netherlands, trying to engage more farmer-breeders in potato selection work through extensive and free distribution of seeds, seedlings and clonal material, the provision of technical assistance, and incentive and premium payments. Over the past decades, there has been a decrease in the number of farmer-breeders as the population ages. This triggered new and younger farmers, as well as companies, to become engaged in seed potato selection. This urgency was especially felt by Dutch organic farmers after the dramatic potato late blight incident in 2007. Between 2000 and 2007, 20% of the country's organic potato growers stopped producing potatoes because there were no late blight resistant cultivars and no alternative fungicides for late blight are permitted in the Netherlands. This became the key issue.

The Dutch organic potato sector has taken the initiative to establish a model through the public-private funded project BioImpuls. It is a long term program, involving six commercial companies, two public research institutes and an increasing number of organic farmer-breeders to collaborate and improve the access and availability of organic

potatoes and potato seeds. The intention is to develop a variety with blight resistance genes from wild relatives, and to support a big number of organic farmer-breeders. To organize training courses in selecting potato late blight resistant varieties with market potential.

Türkiye

“Biodiversity for Food and Nutrition” - BNF project in Türkiye http://www.b4fn.org/)

Some extracts from the project:

The project focused on generating food composition data for 43 species of wild edible plants, including mushrooms and landraces, from three geographically distinct locations in Türkiye: the Black Sea, Mediterranean and Aegean Region pilot sites. Wild edibles are still collected and used for home consumption, particularly in rural areas, or are sold in local markets contributing to people’s diets and representing an additional income for many households. Market surveys were carried out in both rural and urban settings to determine the market potential for wild edibles. Data generated through surveys was used to increase the knowledge base on wild edibles and increase market opportunities and to build local capacity for value adding practices.

One of the focuses was the cracked einkorn wheat (bulgur) from local landraces, which contains on average 5 times more zinc, 4 times more iron and more calcium than commonly consumed wheat.

The BFN Türkiye project has identified a number of national, multi-sectoral strategies and action plans for the mainstreaming of agricultural biodiversity conservation and sustainable use and broad promotion campaigns.

The Turkish Ministry of Forestry and Water revised the National Biodiversity Strategy and Action Plan (NBSAP) in 2015, to safeguard and promote unique agricultural biodiversity of the country by demonstrating its use in improving diet-related nutrition and health

issues, as do the interactions with the Healthy Diet and Active Life Program and the Nutrition Friendly Schools Initiative of the Ministry of Education/WHO.

Case studies and activities promoting biodiversity food for nutrition were executed for inclusion in the 2016 school curriculum. The project also raised awareness of the conservation and sustainable use of wild edibles through scientific or cultural and gastronomic events.

For example, the Alaçatı Herb Festival has attracted thousands of visitors. There were seminars on nutrition and diets held, as well as exhibitions, nature walks, the selling of local products and plants, activities for children linked to the festival theme, food and cooking workshops and visits to the Wild Edible Plants Collection Garden, were organised.

During the festival, a wild herb collector's competition has been organized rewarding the gatherer of the highest number of edible plants. Another prize was awarded to the best recipe using wild edible plants.

Bulgaria

There were 2 projects, executed in Bulgaria by the People and Nature Association, dedicated to traditional, old vegetable varieties and landraces. Both were announced good practices by the donor, the EEA Grants program.

One of them was the RIGHTS project: „Farmers' Rights to Plant Genetic Resources for Food and Agriculture: Implementation of the Plant Treaty and the Nagoya Protocol in Bulgaria"

The project capitalized on Norwegian experience to advance farmers' rights (FR) in access to plant genetic resources (PGR) in Bulgaria by preparation for implementation of the International Treaty on PGR for Food and Agriculture & Nagoya Protocol and by advising on development of a National PGR Strategy. Outcomes: increased capacity to implement FR for conservation and sustainable use of PGR; improved protection of

traditional knowledge from extinction; increased awareness on bioprospecting, fair and equitable sharing of benefits; a more integrated approach in application of FR; improved ways for integration in sectoral policies and legislation, etc. Outputs: Study of FR in PGR access and policy research; Critical Success Factors in advancing FR; List of measures for implementation of FR; a policy paper for major stakeholders; awareness events and capacity building workshops, public consultations; an action plan for implementation of FR in Bulgaria; policy document for stakeholders.

Pic. 10. Wild edibles in Strandja mountain, Bulgaria. Source: CHI

General context in relation to the farmers' rights in access to PGR:

Governments are developing and implementing policies to resolve agro-productivity, food and agro-biodiversity issues at the same time conserving plant genetic resources. A significant challenge in this process is the limited capacity to collect, conserve, manage and utilize PGR sustainably. Access to PGR is fundamental for food security and agriculture. By The UN Food and Agriculture Organization (FAO) estimates the World will need 70 % more food by 2050 for sufficiency of the growing population. In this context, genetic resources are a strategic component of the future. They are an important cultural heritage as well. The preliminary study of FR in access PGR in Bulgaria showed that there is insufficient access of farmers to PGR and insufficient cooperation between the research and variety breeding sector and the agro-NGOs. This is a problem for research, gene bank(s), for farmers and for policy makers. There is no national program for PGR to strengthen cooperation and networking at national level. There is no well established operational infrastructure for communication and collaboration between various stakeholders, businesses and NGO's. Currently, collaboration with farmers is sporadic and no one benefits from each other's strengths: the farmers to utilize genetic resources, the Institutes - to use farmers for maintaining and enlarging the diversity of the PGR and extention of PGR territories, etc. Established infrastructure will support regular and systematic exchange and will reflect on PGR utilisation, will inspire growers to "grow" and to preserve biodiversity for future generations. There is a need to attract and involve younger and larger farmers to use PGR and utilise the Bulgaria's richness in local varieties and populations. More public and political attention is required to respond to the above mentioned needs with adequate regulatory mechanisms. As acknowledged by Bulgarian stakeholders in various sources, the need is: "..the improvement of the interaction between the ex situ, in situ and on-farm conservation sector, improved legislative framework for crop wild relatives (CWR) and landrace conservation".

Pic. 11. Seminar on farmers' rights in access to PRG. Source: CHI

The second project was: „Heritage seeds - linking people and nature in the urbanizing environment", contract 30/27.10.2014, EEA Grants, executed in 2014-2016.

The tasks of the project were: • How to conserve and document genetic variation in BG horticultural plant material; •Make horticulture genetic resources and related information accessible for breeders, scientists, and other bona fide users. •Contribute to sustainable use and development of horticulture plant genetic resources. •Knowledge transfer - participation in research, trainings and education, nationally and internationally. •Survey of international trends scientifically and politically, aiming at influencing the international agenda and to advice BG national authorities on matters concerning plant genetic

resources. The partners were the Norwegian Seed Savers Network and the Norwegian Forest and Landscape Institute-Genetic Resourse Center.

The mission of the project was to achieve a connection between people and nature in the urbanizing environment, by dynamizing the use of the inherited seeds of old, traditional vegetable varieties and landraces, including wild ones. Within the framework of the project, a network of producers - farmers and gardeners, business representatives - traders, decision-makers (Ministry of Agriculture) was built. The goal was assistance in the protection of genetic biodiversity and preservation of endangered Bulgarian vegetable species.

Representatives of agribusiness - market-oriented small farmers and gardeners in remote rural areas were involved in the activities. Remoteness was sought after because growing plants from old local seeds is most successful in places with preserved traditions and natural environments, close to those, applied for organic production.,

Three demonstration tests were organized in places, known for preserved old Bulgarian varieties and populations of vegetables. Three producers were financially supported to produce local vegetable varieties and conduct a test with: two local pepper varieties – “Shablenska kamba” (rotund) and the so called “village pepper”, suitable for drying (strongly connected with the cultural gastronomy traditions of Bulgarians), and a producer of a local potato variety - Samokovski potatoes, on an area of one hectare. The project covered the costs for purchase of seeds, manual processing (5-6 times during the period), watering (5-6 times). The three tests were documented step by step.

Pic. 12. P&N test: Versol farm – bio-agriculture and home produced food from collective farm.

Pic. 13. Ratund test (Shablenska Kamba pepper)

Pic. 14. Growing of Shablenska Kamba pepper

Trainings were organized for small-scale producers to support sustainable agro-bio economy in peripheral areas. Meetings were organized with representatives of the Ministry of Agriculture and the Bulgarian gene bank, to discuss the possibilities of dynamizing the production of BG vegetables and conservation of inherited old seeds through active cultivation. Seeds from the tested “Shablenska Kamba” pepper were delivered to the National gene bank for “cleaning” and conserving. Contacts were made with the World Seed Bank in Svalbard, Norway, which considers Bulgaria as the country of origin of fruit and vegetable seeds, including wild crops, to exchange information and obtain knowledge.

The needs of producers and consumers were identified and the valorization of traditional local varieties was carried out.

Pic. 15. Local producers

Seed savers organisations in Europe

Seed saving organisations have been established in many European countries. Some of them are:

1. Arche Noah (Society for the Maintenance and Promotion of Crop Diversity) in Austria, founded in 1990. They produce an annual seed handbook (Sortenhandbuch), run an organic visitor's garden that attracts some 30,000 visitors a year, arrange member meetings and seed swap, cooperate with farmers to encourage increasing on-farm diversity and also encourage breeding new varieties (see https://www.arche-noah.at).

2. Association Kokopelli in France, founded in 1999. It offers some 2,000 different vegetables each year. In 2007, it distributed 550 varieties of tomatoes, 300 varieties of chillies, 130 varieties of lettuce, 150 varieties of squashes, 50 varieties of eggplant, etc. (see http://kokopelli-semences.fr)
3. ProSpecieRara was established in Switzerland in 1982 to save endangered breeds of Swiss farm animals and traditional crops (see https://www.prospecierara.ch). It also maintains or supports a network of 52 locations in which traditional animals and crops are made accessible to the public.
4. Frøsamlerne, or Danish Seed Savers was founded in 1987 to collect, test, and exchange seeds and seedlings of old or rare varieties. It works to preserve the genetic and cultural heritage in horticulture and agriculture. The association organizes a variety of member's courses, field trips, garden visits and seed exchanges. An annual seed list is produced. There were over 700 members in 2015. (see http://www.froesamlerne.dk).
5. The Irish Seed Savers Association was founded in 1991 and maintains over 800 varieties of vegetables, grains, apples and potatoes. It has its own open organic seed gardens with orchards and woodlands and arranges a range of workshops (see http://www.irishseedsavers.ie).
6. Foreningen Sesam is a Swedish association primarily for dedicated growers who are interested in unusual or old vegetable varieties and other crops and who want to preserve these through active cultivation. An annual yearbook is produced as well as a quarterly newsletter. Seeds are produced both by the members themselves and through a number of working groups devoted to particular plant families. Trained members are given the responsibility of producing seed, often of more difficult or unusual varieties. (see http://www.foreningensesam.se).
7. The Finnish Landrace Association Maatiainen was founded in 1989 and has over 1,700 members. It aims to conserve, in a living form, traditional varieties of ornamental and useful plants, original landraces of domestic animals and rural

landscapes and to promote their active utilisation. Members collect the seed themselves, and wild plants are also included. For each batch of seed collected the member receives a packet of seed in exchange. Each batch is sufficient to fill several packets so that the remainder can be sold to members and the general public. The association's unique collection comprises some 500 named accessions thus forming a living seed bank. (see http://www.maatiainen.fi).

8. Planteklubben for Grønnsaker (Norwegian Seed Savers) in Norway was founded in 2005 has currently 500 members, produces a yearbook each year in February with about 250 Norwegian heirloom vegetables, herbs, potatoes and berries and about 130 other unusual edibles. It also produces an autumn catalogue for plants that are best propagated at that time of year. There is also a network of member gardens open on agreement (see http://www.skogoglandskap.no/fagartikler/2007/planteklubb_gronnsak_potet).
9. Kultursaat in GermanyKultursaat, Association of Biodynamic Plant, Breeders, Neu Darchau, Germany e.V., https://www.kultursaat.org/impressum/kontakt.html; Sitz und Geschäftsführung Echzell, Tel.: + 49 (0) 60 35 - 20 80 97 Fax: + 49 (0) 60 35 - 20 80 98, https://www.kultursaat.org/pdf/santafe09.pdf, the First Certified Biodynamic Varieties, 1Kultursaat e.V., Echzell, Germany, Email: kontakt@kultursaat.org, MSc Michael Fleck
10. There is also an umbrella organization for Europe called the SAVE Foundation (see http://www.save-foundation.net) with lots of useful links including other organisations interested in seed saving in Europe: http://www.save-foundation.net/en/network/partner-en.

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