

# DiverBeans

## Report of the first stakeholder workshop held in North Macedonia

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REPORT OF THE FIRST STAKEHOLDER WORKSHOP HELD IN  
NORTH MACEDONIA

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## Background

Common bean (*Phaseolus vulgaris* L.) is a crop that is traditionally grown and widely consumed in North Macedonia. Despite its cultural and economic relevance, total bean production has reduced by about 30% in the last ten years (1). Many environmental, social and economic factors hamper bean production in the country. The DiverBeans project aims to improve organic bean production in North Macedonia. This is a two-year project funded by Coop (through ETH Foundation), a retail and wholesale market company in Switzerland. Coop has been buying organically produced beans from one of the project partners, Suzana Dimitrievska, in North Macedonia since 2016. They are now interested in increasing the quantity of beans that they can import for the Swiss market. Effective implementation of the project requires involvement of multiple stakeholders and therefore, the project adapted a transdisciplinary approach from the outset.

The transdisciplinary research process tries to link two types of knowledge in order to develop solutions. One is the scientific knowledge, where scientists conduct research on e.g., the societal issues. The second is the knowledge outside academia, where actors e.g., try to understand and tackle a particular farming related problem (2,3). In a transdisciplinary research process, this knowledge will be brought together and integrated in a process of dialogue in order to jointly create and validate new knowledge and to learn from each other. Transdisciplinarity is an important project approach that involves real world problems and it accepts that scientists, practitioners and affected communities have a different viewpoint of the existing issues and different expectations. The aim is to find better solutions that are acceptable by stakeholders and have therefore a higher potential to be implemented. Therefore, as a first step in our project, we organized and delivered a stakeholder workshop in North Macedonia on the 3<sup>rd</sup> and the 4<sup>th</sup> of September, 2019.

## Workshop objective

The aim of the workshop was to create a shared understanding of the situation and challenges faced by bean farmers in Macedonia. In addition, the workshop was also an opportunity where project partners could meet for the first time, get to know one another and share how they would contribute to the project. Ultimately, the outcome of the discussions in the workshop were to be used to plan the next phase of the project.

## Workshop participants

On the first day, the main project partners attended the workshop. These were:

- The principal investigators: Christian Schöb (Agricultural Ecology group, ETH Zürich), Pius Krütli (Transdisciplinarity Lab, ETH Zürich) and Pietro Iannetta (Ecological Sciences, The James Hutton Institute).
- Akanksha Singh (Agricultural Ecology group, ETH Zürich, the project coordinator)
- Suzanna Dimitrievska (the main collaborator farmer of the project, Suzana is the owner of Eko-Ilinden farm and has been supplying beans to Coop since 2016)
- Mirjana Jankulovska (our local scientific collaborator from the Faculty of Agricultural Sciences and Food, Ss Cyril and Methodius University in Skopje). Mirjana is responsible for providing different accessions of local bean varieties.

On the second day in addition to the main project partners, the workshop was attended by:

- Ten bean farmers from the Mustafino region
- Dr. Rukie Agic (representative from the Faculty of Agricultural Sciences and Food, Ss Cyril and Methodius University in Skopje)
- Two bachelor students who helped us with the translation (Faculty of Agricultural Sciences and Food, Ss Cyril and Methodius University in Skopje)
- Jacqueline and Ljupcho Vasilev (local agronomist consultants, Ljupcho works for Pro Specie Rara)
- Gabriela Micevska (representative of Palladium, an international development foundation supporting sustainable businesses in North Macedonia).

### Workshop structure and methodology

The workshop was held in Mustafino village (located in the North-central part of Macedonia) at the office of our main collaborator farmer, Suzana Dimitrievska. The first day was an informal discussion between the main project partners. The aim of the first day was for the project partners to get to know one another and share their understanding of the project. First, we discussed the different project methodologies and the project timeline. There are three different approaches in the project, crop diversification, transdisciplinary process and improving the utility of legumes. Each of the principal investigators specialize in one of these three different approaches and they presented the relevance of each of these approaches to our local partners. Afterwards, we discussed with Suzana the challenges, culture and politics of bean farming in the region and in her farm. Finally, we visited the farm site in Mustafino (Picture 1) where our field trial will be held in 2020.



Picture 1: Landscape in the Mustafino region

The second day started with brief presentations explaining to the participants our project and the different project methodologies. The project coordinator first presented the project overview and timeline, followed by Dr. Krütli's presentation on the transdisciplinary process, then Dr. Schöb's presentation on crop diversification methodology and finally Dr. Iannetta's presentation on measures to enhance economic potential of legumes. The presentation was translated in Macedonian for our local participants. The presentations were followed by some heated and informative discussions after which the participants introduced themselves. We asked the participants to give us their names, occupation and tell us what they were expecting from the workshop.

After participant introduction, we started our group exercise. The exercise was called, '*Rich Picture Exercise*' and it was chosen from the toolbox called '*Methods and tools for co-producing knowledge*', which has been co-developed by the Transdisciplinarity Lab (TdLab, see: <https://tdlab.usys.ethz.ch/toolbox.html>). Rich picture is part of the Soft System Methodology by Checkland & Poulter (4). The aim of the first part of the exercise was to create a shared understanding of the current situation and challenges that bean farmers face in Macedonia. The aim of the second part was to draw collaborative solutions for the identified problems. The participants were divided into three sub-groups: a large-scale farmer group, a small-scale farmer group and a group of local academics and consultants (Picture 2).



Picture 2: Participants working on the Rich picture exercise

For the first part of the exercise, we asked the participants to draw their current situation and challenges on a flip chart within their sub-groups. Afterwards each group presented their picture and we summarized the discussions (Picture 3). For the second part of the exercise, we asked the sub-groups to specifically think of and draw concrete activities that would be required to carry out potential improvements to their situation. Similar to the first part, each group presented their picture and we summarized the discussions.

For both parts of the exercise above first, the participants were asked to individually think of their opinion, then discuss their opinions within their groups and only after that start to draw the picture. At the end, we asked the different stakeholders for their feedbacks and closed the workshop.



Picture 3: Participants presenting their group picture

### Summary of the workshop discussions and exercises

The stakeholders actively participated in the discussions and the exercises and were overall willing to share their knowledge and experience. As all farmers were from the Mustafino region, the summary below focuses on this region. Overall, we can summarize the discussions under three different categories- current situation of common bean production; main challenges facing bean production and; potential measures to combat the challenges. Each of these categories are described below:

#### Current situation of common bean cultivation in the Mustafino region

Mustafino falls under the Mediterranean agro-ecological zone of North Macedonia, which is characterized by floodplains to undulating hills, falling at the elevation range between 50 to 600 meters. This is one of the most intensively cultivated regions in the country (5). In addition to beans, farmers grow several crops such as alfalfa, watermelon, barley, grapes, peppers, peas and apricots. This region has extreme hot summers from May to September and extreme cold winters. During summers, temperatures often reach higher than 40 degrees centigrade and there is no rainfall. Hence, farmers are dependent on ground water irrigation for their crops and they usually irrigate by the sprinkler method. Strong hot winds also start around June and last until August.

Farmers commonly grow beans in monocultures and usually beans are grown in the same field for 2-3 consecutive years. Our discussions suggested that farmers were resistant to the idea of mixed-cropping as they believed it would not be economically feasible. Traditionally in this region, bean is grown in early April as an early-season crop. This early sowing occurs to avoid high sunlight intensity and hot winds in July that can damage the bean flowers. Bean cultivation is not fully mechanized; seeding and fertilizer application is done by machines. However, harvesting and weed removal is done by hand. Farmers usually do not use pesticides, as pests are not a yield-limiting factor. Organic fertilizers are only applied once at the beginning of bean production and one of the common fertilizers used is chicken manure.

In the fields of our main collaborative farmer Suzana, distance between planting rows was as large as 75 cm. The soil was ploughed before sowing and a machine was used to sow seeds up to a depth of five cms. Suzana does not grow cover crops in her fields and they are kept barren over winter. The soil is sandy loam with a critically low organic matter content (ca. 1 %, FiBL data) and potentially low water retention capacity. Hence, in Suzanas' fields methods to increase the soil organic matter, e.g., growing cover crops or practicing minimum tillage, could be essential for improving bean production. Currently, large amounts of water is used to irrigate bean fields. Each hectare is irrigated for about 4-5 hours each day using sprinklers. There are about 15 sprinklers used per hectare and each sprinkler releases approx. 100 liters of water per minute. There is no marginal protection in the fields by any vegetation such as hedges, trees or shrubs. Suzana exports the best quality beans to Switzerland, sells the second best quality in the Macedonia market and uses the rest as animal feed.

#### The main challenges of common bean production

- Weather variables such as drought, high sunlight intensity and hot winds were determined as other limiting factors for bean production in the area. These variables are specifically damaging in the absence of any protected field margins. Strong sunlight and hot winds pose a problem when they occur during the flowering stage of the bean plants, leading to loss of flowers and ultimately to yield. Due to low rainfall in the summer months, farmers are dependent on sprinkler irrigation to water their crops and they use government water supply for their fields. However, the supply is not always reliable. Specifically, during flowering stage, insufficient water has been observed to be detrimental for bean plants.
- High weed pressure was a common problem, especially as the distance between planting rows was as large as 70-80 meters. Weeds need to be removed by hand and this leads to high labor costs.
- For small-scale farmers, lack of mechanization was another problem. These farmers cannot afford to buy machinery and depend on labor for cultivation, resulting in high costs.
- Labor availability was a challenge for all farmers. Availability of labor is low due to low population size of the country (about 2 million) and due to high rate of migration out of the country.
- The agriculture sector in Macedonia is not managed strategically and there is high variation in market price of agricultural produce across the year. Irregular market

price is particularly an issue for small-scale farmers as they do not have storage facilities and have to sell their produce soon after harvesting, irrespective of the market price at that instant.

- Farmers also stated that there is lack of information, institutional support and technical advice. For example, there is no weather prediction service through which farmers can be informed of suitable sowing times for beans. There are also no suitable subsidies provided by the government that could be of use to the farmers.
- Local scientists and consultants mentioned that they are also limited in their ability to develop solutions due to lack of funding for agricultural research.

### Potential measure to combat the challenges facing bean production

It is out of scope of the project to derive solutions for issues such as labor availability or irregular markets. Therefore, we asked the participants to think of concrete actions or approaches that our project could adopt in combating the challenges facing bean production. The following were some of the promising suggestions:

- To create a demonstrative field where experimental trials can be conducted and be open to all farmers to visit.
- To experiment with different sowing time in the field trial.
- Form small cooperatives to assist with dissemination of knowledge. Members of these cooperatives could be trained, mentored and given technical support.
- Establishment of meteorological stations to predict weather patterns and advise farmers on sowing and harvesting times.
- Identification of weed management techniques, bean varieties and additional crops that can be grown.
- Farmers to maintain detailed record of the history of cultivation in their fields. This would help in better planning and understanding of the yield output.
- Transparency in dissemination of results.
- Creation of a group where farmers can share their successful or unsuccessful stories.

### Future outlook

The workshop emphasized the role of drought, low soil organic matter content, high intensity of sunlight, hot-dry abrasive winds (lack of protective cover) and weed pressure as limiting factors of bean production. Designing suitable mixed cropping systems, which is one of the principal approaches of our project, could provide promising measures to overcome these environmental challenges. Mixed cropping could potentially reduce weed pressure in bean fields and further provide farmers with additional source of income in case of low bean yield.

The problem of water shortage could further be combated by designing suitable irrigation measures. Currently the farmers use sprinklers for irrigation. This method uses more water than required for the plants. In addition, most of the water in this case fall on the vegetation and is evaporated. Changing the irrigation method to a more targeted subsurface irrigation system such as drip irrigation would be a more efficient use of water.



To overcome the issue of lack of technical advice and cooperation, we plan to create a group with all farmers who were present for the workshop and share with them project progress in real time. Furthermore, towards the end we will also share technical booklets and leaflets including information on successful bean cultivation methods.

Below are the concrete steps that will be included in the next phase of the project regarding crop mixtures:

- First, we will conduct a greenhouse trial with multiple bean varieties under different levels of water stress. The aim of this trial would be to find 2-3 varieties that are tolerant to low water availability.
- In the second step, we will conduct another greenhouse experiment. Here we will mix bean varieties chosen from the first trial with other relevant crops to find crop and variety combinations that increase bean yield per unit area and require less water for irrigation. We have selected sunflower, chickpeas and sorghum as additional crops due to the reasons mentioned below.
  - o Sunflower and chickpeas are crops commonly grown in Macedonia.
  - o Sunflower and chickpeas have a potential to be economically profitable.
  - o Sunflower and sorghum are taller plants and they could potentially protect the beans against strong sun and against weeds.
  - o Sorghum has been chosen as it is a drought tolerant plant.
- In the third step, we will conduct participatory field trials with potentially five chosen crop combinations in North Macedonia. We will conduct the trial in two different locations across the country. These are: (a) Eko Ilinden farm located in Mustafino village in North-central Macedonia. This farm belongs to our main collaborative farmer Suzana Dimitrievska. (b) Ljupcho Vasilevs' farm located in Bogdanci in South-east Macedonia. In two of the locations (Mustafino and Marsal Tito) we have 1 hectare land available for trial. In Ljupchos' farm we have about 0.7 hectare for trial (more details on the field visit can be found on page 9)
  - o Before the trial, we will hold another workshop in Macedonia with the stakeholders. In this workshop, we will plan the field trials and decide on a system of knowledge exchange. Potentially for the next workshop, we would also like to invite an organic expert who has extensive experience in warm dry regions.
  - o Farmers are interested in finding optimum sowing time for beans. Therefore, we will experiment with both, early sowing (middle or end of April dependent on weather) and late sowing (late May/early June) in two of the locations (Mustafino and Marsal Tito). In Ljupchos' farm we will only trial late sowing of bean plants due to limited smaller size of the available field.
  - o These trials will also be used as demonstration fields. We will organize demonstration events where farmers will be invited to view the results of different crop mixtures.
  - o The trials will be designed in alley cropping systems where multiple rows of beans will be grown in between rows of additional crops and be bordered by

rows of a shade plant (sunflower or sorghum). Such a design would allow large-scale farmers to use machines for bean cultivation. Hand cultivation in large-scale fields is both costly and labor-intensive. This is specifically unsuitable for Macedonia due to low labor availability and high labor cost. Hence, alley cropping design may enhance adaptation by farmers of mixed cropping systems.

- We will install a drip irrigation system in our field trial plots. This will be an automatically controlled system and sensors will be put in the ground that measure soil moisture. Water will only be released for irrigation once a minimum level of field water capacity is reached.

### List of Project Partners in Macedonia and their roles

- Suzanna Dimitrievska (the main collaborator farmer of the project), Suzana is the owner of Eko-Ilinden farm and has been supplying beans to Coop since 2016. One of our field trial in 2020 will be held on Susana's land.
- Mirjana Jankulovska (our local scientific collaborator from the Faculty of Agricultural Sciences and Food, Ss Cyril and Methodius University in Skopje). Mirjana is responsible for providing us with different accessions of local bean varieties.
- Ljupcho Vasilev (local agronomist consultant working for Pro Specie Rara). Ljupcho introduced us to some of the local farmers and companies in North Macedonia who are interested in producing beans. Ljupcho also provided us with 5 local bean varieties to trial with. Ljupcho's family is also into farming and we will be conducting one of the trials on one of his family fields.

## Summary of field visits in Macedonia, September 2019

Republic of North Macedonia is a small landlocked country with an area of about 25,713 km square. Despite its small size, it has a large variety of landscapes and is divided into three main agro-ecological zones (continental, alpine and Mediterranean) (5). Each of these zones have distinct climate and soil, hence, a crop combination, which may be productive in one region, may not be productive in another. We visited other regions of the country to find farmers willing to collaborate in the project and conduct field trials on their land. The regions visited were Kumanova (North-central), Kochani (North-east) and Gevgelija (South-east). In total six farmers were interviewed (two large-scale and four small-scale farmers). The small-scale farmers (2-4 hectares of agricultural land) in these regions were interested in hearing of the progress of the project but were not eager to be involved in the field trials due to lack of financial resources. This will be a participatory field trial and all costs will be borne by the farmers. We will contribute by installing an irrigation system in their fields and potentially by providing them with seeds. Hence, we decided to do the second trial in the field of our project partner Ljupcho Vasilev, which is located in Gevgelija (South-east).

In all of these regions visited, water availability for irrigation was not a problem and the farmers were dependent on lake or river water for irrigation. These areas are less intensively cultivated than the Mustafino area and small-scale farmers even practiced mixed cropping in all these three regions.



Picture 4: Mixed cropping field in Gevgelija

Similar to Mustafino, farmers did not use pesticides in the fields and used animal manure as a fertilizer. For the small-scale farmers, high intensity of sunlight and weed pressure were the main limiting factors of bean production. Inclusion of a shade plant could potentially be beneficial for bean farming across the country. Small-scale farmers did not use machines for bean cultivation.

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