



TRAnsition paths to sUstainable
legume-based systems in Europe

Report of the 2nd Continental Legume Innovation and Networking (C-LIN) Workshop

*“Looking at Legumes through
the Consumer’s Eyes”*

11-13 September 2018, Budapest, Hungary
hosted by ESSRG and Agri Kulti



This Project has received funding from the European Union’s Horizon 2020
research and innovation programme under grant agreement No 727973

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1. Executive Summary

The 2nd Continental Legume Innovation and Network (LIN) workshop was held on the 11th - 13th of September 2018 in Budapest, Hungary, hosted by ESSRG and AgriKulti. The meeting provided another exceptional opportunity to bring together sustainable farms and professionals involved in responsible farming, processing and trading, consumers and NGOs and to interact with members of the TRUE project.

TRUE's perspective is that the scientific knowledge, capacities and societal desire for sustainable legume supported systems exist, but that practical co-innovation to realise transition paths have yet to be achieved. Against this background, the aims of this Legume Innovation and Networking Workshop were to:

- share legume focused activities with other networks and actors;
- exchange insights from legume-based innovations;
- collate challenges and needs regarding legumes across the entire value chain;
- gather stakeholder assessments on legume markets and policies; and,
- identify key leverage points for improving framework conditions for legume-based food- and feed-chains.

The first day of the conference provided an open forum, with presentations of participants based on the rules of **Pecha Kucha**. In the evening, a Networking Event was held on the famous ship of A38 on the River Danube with a spectacular view of Budapest at night. Day Two focussed on networking and knowledge exchange co-organised by the Budapest Business School, University of Applied Sciences. The main hall of the university provided space for a series of 10-minute-long keynotes on a variety of topics related to legumes. The poster session and a stakeholder world café were held for the entire day. Day three saw participants embarked on a most exciting trip to Lake Balaton, *aka* the Hungarian Sea. It seems that fate wants beans to flourish, as this year's gastro star around Balaton was Bean 'Törek' which we visited on Lajos Fodor's farm. After looking at the plants, the legume committed staff of Kistücsök restaurant demonstrated how they transform legumes into sustainable diets.

The whole event focused on consumers, convened **50 participants**, which included TRUE members and stakeholders across the whole legume-based value chain. Also, **14 oral presentations** plus **20 poster presentations** and **a stakeholder world café with three parallel groups** were organised to discuss different aspects of legume related topics. The main **points** outlined by the **presentations** focused on **legume consumption habits in different parts of Europe, the role and significance of education on legumes and the various innovative ways to make legumes known and loved** (e.g. snacks, 'Choose Beans' project, school catering, private and public food service, etc.). Much data was presented on environmental investigations, researches, crop diversification, environmental challenges, genetic reserves and their values in Hungarian legume production, and overall, **the place of legumes in Hungary and Europe**. Topics on meat vs. legumes, the effect of legumes on environmental footprint and retailer-producer quality chains were also widely discussed. The **outputs** from the workshop can be clustered into four topics related to barriers and opportunities in: 1, production; 2, education; 3, consumers; and 4, policy.

1. Production

Legume production was discussed both in terms of the success and the challenges encountered as a result of different climatic surroundings. The unique and innovative study of genetic reserves of common bean landraces at Hungary-based Centre of Plant Diversity Institute (CPD) by the two Hungarian organisers (ESSRG, AgriKulti) created an excellent insight into the conditions of legume production in small-scale farms, as well as on big plantations, in sand and in soil and in different microclimatic environments.

2. Education

Educating people and spreading valuable, traceable and credible information regarding the endless benefits of legume production and consumption was repeatedly highlighted during the conference. Several lectures and posters addressed public food reform, the involvement of legumes in school catering and the snack market. Development of protein-rich food based on extrusion was also an important topic. Furthermore, educating people (children as well as adults), e.g. via field trips, by making legumes a fundamental element of everyday eating habits, or by integrating legumes into public food chain menus were topics of discussed.

3. Consumers

Given the title of the conference, “*Looking At Legumes Through the Consumers’ Eyes*”, a significant part of the three-day programme was dedicated to where and which legumes can be bought either in unprocessed forms (e.g. farmers’ markets, organic shops, on-farm shops) or in some processed forms (e.g. snacks, canned legumes, pickles, food in restaurants, etc.). The third day of the conference took place by Lake Balaton on a bean farm and in a restaurant, which serves meals cooked exclusively with products of nearby, sustainable farms.

4. Policy

Policies influencing legume production and consumption have been addressed by presentations and posters presented during the first and second day. Outcomes of the world cafés were analysed from a policy perspective, that is which policies could have a positive impact on legume consumption.



2. Introduction

2.1 Background & Objectives

TRUE is funded by the European Commission's Horizon 2020 Programme over four years until March 2021 to explore strategies to reduce the EU's dependency on imported protein food (soybean) and synthetic nitrogen fertilisers. In this context, TRUE aims to identify the best routes, or "transition paths" to increase sustainable legume cultivation and consumption across Europe and includes the entire legume feed and food value chains. During the project, **Legume Innovation and Network (LIN) workshops** are organised to involve relevant stakeholders in a multi-actor approach. They take place in three geographical regions with different pedo-climatic conditions: Atlantic, Continental and Mediterranean. In 2020, a final common European Workshop will be organised to build a single European Legume Innovation Network. The workshops are intended to help:

- share legume focused activities with other **networks and actors**;
- exchange insights from **legume-based innovations**;
- collate **challenges and needs** regarding legumes across the entire value chain;
- gather stakeholder assessments on **legume markets and policies**; and,
- identify key leverage points for **improving framework conditions for legume-based food-and feed-chains**.

2.2 Workshop framework, participants and methodology

The second Legume Innovation and Networking (LIN) Workshop of the Continental Region was organised by **ESSRG** (Environmental Social Science Research Group) and **AgriKulti**, an independent research and development non-profit company. Each day of the conference was held in a different location: the **first day** took place on the River Danube, on the famous **event ship, A38**. The **second day** was hosted at **Budapest Business School**, whilst the **final day** took the participants to Lake Balaton, where a visit of **a Hungarian farm** of Lajos Fodor in Töreki which is famous for its wide variety of beans was organised. The conference ended in one of the most popular restaurants in Hungary: "**Kistücsök**", which has an excellent reputation for using local products of sustainable farms to maintain **sustainability, diversity and transparency**.



The workshop brought together **50 TRUE members and stakeholders** across the whole legume-based value chain to exchange ideas on how to increase legume production and consumption in Europe. The represented stakeholder groups spanned producers, advisors, breeders, processors, machinery-suppliers, retailers, decision makers, researchers, consumers and scientists.

Besides **oral and poster presentations**, a **World Café session** organised in three parallel groups took place to allow participants to share their opinions on the challenges and needs affecting legume markets and policy.

3. Presentations

A copy of all the presentations and posters have been uploaded to the TRUE website [here](#). In addition, a full video recording of the workshop can be accessed on YouTube [here](#).

3.1 Presentations Overview

The main points highlighted during the presentations were:

- the value chain of legumes in Hungary and their place in small scale farms;
- the challenges of climate change and the different outcome of legume production within the different climatic conditions in Hungary;
- the place of legumes in school catering;
- the difficulties of crop diversification;
- genetic reserves of common bean landraces at CPD, Hungary;
- reviving a traditional food culture based on legumes;
- the environmental footprint of rotations with and without legumes;
- legumes and protein extraction;
- current eating habits and experiences of vegetarians, vegans and omnivores;
- the nutritional aspects of legumes; and,
- legume products in Europe.

3.3 Presentations Summaries

Day 1, Pecha Kucha¹ presentations, A38 Ship

Session 1

1. TRUE Activities and Innovation Background

Pietro Iannetta, TRUE coordinator, The James Hutton Institute, UK

TRUE's perspective is that the scientific knowledge, capacities and societal desire for legume supported systems exist but that practical co-innovation to realise transition paths have yet to be achieved. TRUE presents 9 Work Packages (WPs), supported by an *Intercontinental Scientific Advisory Board*. Collectively, these elements present a strategic and gender balanced work-plan through which the role of legumes in determining how the '*three pillars of sustainability*', '*environment*', '*economics*' and '*society*' may be best resolved.

TRUE realises a genuine multi-actor approach, the basis for which are three *Regional Clusters* managed by WP1 ('*Knowledge Exchange and Communication*', University of Hohenheim, Germany), that span the main pedo-climatic regions of Europe, designated here as: *Continental*, *Mediterranean* and *Atlantic*, and facilitate the alignment of stakeholders' knowledge across a suite of 24 Case Studies. The Case Studies are managed by partners within WPs 2-4 comprising '*Case Studies*' (incorporating the project database and *Data Management Plan*), '*Nutrition and Product Development*', and '*Markets and Consumers*'. These are led by the Agricultural University of Athens (Greece), Universidade Catolica Portuguesa (Portugal) and the Institute for Food Studies & Agro Industrial Development (Denmark), respectively. This combination of reflective dialogue (WP1), and novel legume-based approaches (WP2-4) will supply hitherto unparalleled datasets for the '*sustainability WPs*', WPs 5-7 for '*Environment*', '*Economics*' and '*Policy and Governance*'. These are led by greenhouse gas specialists at Trinity College Dublin (Ireland; in close partnership with Life Cycle Analysis specialists at Bangor University, UK), Scotland's Rural College (in close partnership with University of Hohenheim), and the Environmental and Social Science Research Group (Hungary), in association with Coventry University, UK), respectively. These *Pillar WPs* use progressive statistical, mathematical and policy modelling approaches to characterise current legume supported systems and identify those management strategies which may achieve sustainable states. A key feature is that TRUE will identify key *Sustainable Development Indicators* (SDIs) for legume-supported systems, and thresholds (or goals) to which each SDI should aim. Data from the *foundation WPs* (1-4), to and between the *Pillar WPs* (5-7), will be resolved by WP8, '*Transition Design*', using machine-learning approaches (e.g. *Knowledge Discovery in Databases*), allied with *DEX (Decision Expert)* methodology to enable the mapping of existing knowledge and experiences. Co-ordination is managed by a team of highly experienced senior staff and project managers based in The Agroecology Group, a Sub-group of Ecological Sciences within The James Hutton Institute.

¹ PechaKucha is a presentation style in which 20 slides are shown for 20 seconds each (6 minutes 40 seconds in total). This format keeps presentations concise and fast-paced, which is important especially in multiple-speaker events.

2a. The Value Chain of Legumes in Hungary and 2b. The Place of Legumes in Small Scale Agroecological Production - experience from Szezon Kert

Katalin Réthy, Agroecologist/Vegetable Farmer (Szezon Kert), Hungary



Part 1: The value chain of legumes in Hungary- a qualitative analysis

A qualitative analysis of the Hungarian legume sector was conducted with the participation of 17 stakeholders in the field. The goal was to gain oversight on the value chain. Specifically, in terms of the barriers and opportunities present in the sector. In the long term, the analysis also aims to strengthen cooperation among members of the value chain. Interviewees were selected from a wide variety of backgrounds, such as research, policy, plant breeding, production, public catering and retail. Results show that Hungarian climatic and soil conditions make it possible for a vast variety of legumes to be

grown both for human and animal consumption. A good selection of locally adapted varieties and the knowledge in production is available at specialised research institutes to develop production, processing and consumptions of legumes in Hungary. However, currently the sector is not living up to its potential, and in some areas it is even degrading.

Part 2: The place of legumes in small scale agroecological production- experience from Szezon Kert

Consumer perception of legume products is often based on negative stereotypes related to digestibility, preparation time and lack of variety in recipes and use. Leguminous plants play an essential role in all scales of organic production. Therefore, it is necessary to develop consumption and eliminate these negative stereotypes- starting with offering a wide variety of legume types, products and demonstrated varied uses. The role of leguminous plants in a small scale agroecological vegetable production, alternative fresh products and consumer education was presented with examples from Szezon Kert.

3. Applied research along the whole value chain: an introduction of ÖMKI

Orsolya Papp, Deputy Director, ÖMKI (Research Institute of Organic Agriculture), Hungary



The Hungarian Research Institute of Organic Agriculture (ÖMKi) was founded in 2011 to foster scientific research of organic agriculture in Hungary. In 2012, the on-farm participatory research network was launched. This on-farm participatory research involves close cooperation with farmers, that is simple experiments are fit into the farms' everyday practice. ÖMKi researchers and farmers work together in defining the practice-oriented research questions and in collecting and evaluating the data. Yearly more than 120 farms take part voluntarily in the on-farm network countrywide. When defining the research subject, it is essential to include the whole value chain, since the feedback from consumers and other stakeholders can profoundly affect the research goals and even the end product. Enriching agrobiodiversity, improving organic production systems and organic product development is of crucial importance in our activities. We have different research topics in organic viticulture, apiculture, horticulture and arable cropping. Thanks to our multi-actor approach, ÖMKi is a partner in several Horizon 2020 European projects as well.

4. The gene bank collections of legumes at the Center for Plant Diversity through the eyes of climate change

Lajos Horváth, Head of the Crop Plants Department (CPD), Tápiószele, Hungary



The presentation summarised the experiences, gained during gene bank multiplications, that might help in the direct use of genetic reserves of legumes. Based on observations related to the issues of climate change management, yield security, and the options of utilisation in ecological farming, 14 legume species described in the presentation. And it was concluded that the gene bank is aware of the species- and cultivar-related reactions given to these issues, and that the genetic reserves can be utilised as a backup for the use and breeding of cultivars, which is necessary for the preferred corrections.

5. Legumes in School Catering

Dr. András Bitsánszky, Founder, InDeRe, Hungary

Following the European trend, more and more children have their meals in canteens. As a result, all questions related to nutrition biology and school catering have come into the limelight. Legumes are well represented in Hungarian school catering since regulations forced the caterers to serve legume at least once in a ten schooldays period. However, these regulations are moderately suitable to determine the real consumption, as pupils can reject or only partly consume the food served. Therefore, limited information is available on the real quantity of consumed food and leftovers in schools. In 2017, a food preference survey was conducted in more than 80 Hungarian secondary schools. In this research, plate waste from the canteens was analysed according to the main ingredients. By analysing the served portions and the amount of plate waste, we estimated the real quantities of the consumed food. This presentation focussed on dishes containing legume ingredients only. Legume dishes were served in 26 schools for a total of 2,329 people (pupils and teachers) over the survey period. The data analysis revealed the legume preference in school catering compared to other dishes. The total plate waste of legume containing dishes was about 30% of the total served food.



6. Grain legume research at NARIC Szeged

Dr Melinda Tar, Head of Department of Field Crops Research, National Agricultural Research and Innovation Centre (NAIK), Hungary



Climate change and the one-sided crop rotation system, which contain four main plants (wheat, maize, sunflower, rapeseed) without any legumes, making it necessary to develop new technologies - involving legumes - for integrated cropping systems. This could also offer several benefits for agro-ecosystem, such as a valuable source of protein for food and animal feed, increased biodiversity and reduced nitrogen fertiliser application. The main goals of our group are the collection, preservation and maintenance of the genetic reserves of grain legumes (field pea, chickpea, faba bean and grass pea), and the morphological description and agronomic testing of sources. During our work, we selected highly adaptable varieties with exceptional quality for

small stakeholders and for bigger farms. The use of molecular markers to characterize each breeding line enables us to identify their genetic background of quality and resistance properties. The measurement of protein and vitamin content of the breeding materials was also achieved using various analytical methods.

7. Soybean Production in Italy: why the largest producer in Europe?

Tiziana Centofanti, Researcher and Lecturer, Central European University, Hungary

Italy is the first soybean producer in the European Union with more than 300,000 ha of soybean produced. Large-scale soybean production began around 1980 in the Northeastern part of Italy after the Ferruzzi agro-chemical industrial group purchased a large extension of land for cultivation of soybean in Veneto and Friuli-Venezia Giulia regions. There are three main factors that led to the large-scale cultivation of soybean in Northern Italy: 1) the national economic policy; 2) the agronomy of farms; and 3) the processing industry. In Italy, there appears to be no national policy to support and incentivise the production of soybean. The central policy for which farmers receive economic incentives to grow soybean is the European Common Agricultural Policy (CAP). Italian farmers in Northern Italy benefit from the coupled direct payments for oilseed that include soybean as a rotation crop. While Italian farmers obtain economic incentives for growing soybean from the CAP, the research and extension service necessary to improve the production of soybean is provided by the private sector. The primary reason for this substitution lies in the trade agreement sanctioned by the WTO. Public agricultural research on soybean appears to be constrained in Italy by trade agreement in the WTO. The shift in agricultural research from largely public sector to an increasing



share of private research is a phenomenon that has been observed across the globe. Smallholder farmers and consumers may benefit from the public-private partnership, which needs to become more widely used. In this respect, there are two initiatives, Donau Soja and Europe soya, that aim to provide farmers with standard certification guideline for the sustainable production of soybean in the Danube region and Europe, respectively.

8. Legume land races cultivated for premium gastronomy purposes

True Case Study 17

Gábor BERTÉNYI, Attila KRÁLL, Orsolya SZUROMI, Orsolya GYARMATI, Agri Kulti Nonprofit Ltd, Hungary

Agri Kulti's case study within TRUE project aims at examining the possibility of introducing and enhancing traditional legume varieties into urban gastronomy and revealing the conditions of this from the producers' and consumers' perspectives. Based on a survey research conducted in 2018, legumes are widely regarded in Hungarian gastronomy as "cheap food". Traditional Hungarian cuisine uses limited legume varieties for a small assortment of seasonal (autumn-winter) foods that are somewhat difficult to digest. Contemporary customers are generally cautious with legumes due to their unwanted physiological effects, such as inflation, while modern cuisine turns towards lighter meals. The origin of legumes used even in top gastronomy is unknown. Cultivation experiments of traditional Hungarian legume land races are based on the genetic resource acquired from the Centre for Plant Diversity, Tápiószéle, Hungary. The Centre stores more than 10,000 different legume varieties (including over 4,300 common beans, 1,000 lentil and 1,100 chickpea variations mostly from the Carpathian Basin). Information on the cultivation and the use of the stored land races is missing or limited. Altogether 33 land races out of 7 legume species were selected for 2018. Varieties were selected based on stored sample size, information available on cultivation, physiognomy/behaviour of the plant, colour, size of seed and site of collection. Five small-scale organic farmers were involved in the cultivation experiments from northern to central Hungary, planting a sub-selection of the 33 varieties. Centre for Plant Diversity acted as a reference site, planting all 33 selected varieties. Technological descriptions for organic cultivation and on-farm protocols for the selected legume species were prepared by the Hungarian Research Institute of Organic Agriculture. On-farm protocols are being filled by the farmers themselves, with the assistance of the institute. The first results show significant differences between locations/farms and between varieties (especially among common beans). Based on results, selection will be narrowed down, while new species/varieties might be introduced as well. Organised kitchen tests and sensory examinations will start in 2019. However, preliminary directions for premium use may include attractive and edible flowers of the runner bean, chickpea and cowpea, the green stage chickpea and the fresh cowpea pods, respectively.



9. Vegetarian experiences and eating habits of self-defined ovo-lacto vegetarians, vegans, and omnivores

Andrea Papp, Assistant Research Fellow, PhD student, University of Debrecen, Hungary

The problem of global climate change and the increasing environmental impact brought about new scientific disciplines interested not only in the nutritional impact of diets but also in their environmental impact. Plant-based diets are in the focus of sustainable nutrition research, due to their benefits in resource management and environmental impact. These diets contain less (or zero) animal-based products compared to average diet and tend to be rich in fresh or minimally processed plant-based ingredients.

Vegetarian diets are plant-based diets that contain no meat or even no animal-based products at all. Well-planned vegetarian diets are confirmed to be healthy by many nutritional and dietetic organisations worldwide. However, there is still no resolution in Hungary. As there seems to be an increasing interest toward vegetarian diets, and how the health care system, food industry and catering sector must adapt. However, at present there is a lack of research on the Hungarian vegetarian population.



Our investigation focuses on the lifestyle and eating habits of Hungarian self-defined ovo-lacto vegetarians and vegans. We compare nutritional and environmental traits of diets among self-defined ovo-lacto vegetarian and vegan women with similarly health-conscious omnivore ones. In the first phase, we made a descriptive cross-sectional analysis using an online questionnaire. We were interested in lifestyle, motivation, self-defined health state, eating habits, and food frequencies. Vegetarian groups judged their actual health state to be better than omnivores, and they felt their health improving after going vegetarian, although many reported unpleasant symptoms during the transition period. Many omnivores have tried some vegetarian diets, but they abandoned it for various reasons. In alignment with our expectations, seitan (a wheat derived meat substitute), soy and pulses displayed the closest correlation with the diet itself, in terms of the consumption frequency of the foods. Amongst omnivores, the assumption that a vegetarian meal is especially healthy seems to be the strongest motivation to choose such meals in catering units, while these being cheaper than the non-vegetarian options were the weakest motivational factor.

Session 2

10. Case Study - Lentil farming: Farm structure and motivation of lentil farmers in SW Germany

Verónica Schmidt-Cotta, Agronomist, University of Hohenheim, Germany

Local lentil production has had a successful revival in Southwest Germany in the past ten years. A survey was conducted to identify the key factors for this success. Farmers answered questions regarding agronomic aspects and individual motives for lentil cultivation. Access to processing facilities for separation of the lentil and companion crop is essential to start lentil cultivation. The positive impact of lentils on biodiversity and the high publicity the crop receives are additional important drivers for both, organic and conventional farmers to start lentil cultivation.



11. Make legumes great again - reviving a traditional food culture: Help us to create a cookbook based on European legumes (TRUE WP1)

Claudia Nathansohn, Project Coordinator, Slow Food, Germany

Slow Food is a global movement committed to making our food system more sustainable and thus fit for the future. Slow Food promotes good, clean and fair food, which is produced in a way that does not harm people, animals and the environment. Slow Food involves over a million activists, chefs, experts, youth, farmers, fishers and academics in over 170 countries. Slow Food members are contributing through their membership fee, as well as the events and campaigns they organise. Slow Food Germany is one of the 24 project partners from practice and science involved in the EU project TRUE. Its task within the project is to create a cookbook containing legume recipes from various European regions. These are complemented by historical background information on the used legumes and the dishes, and supplemented by project partners with ecological footprints and nutritional information. The book is to be published by mid-2021 and will then be distributed throughout Europe.



12. The ‘Choose Beans’ project (TRUE CS19)

Elisete Varandas, Nutritionist, Eurest, Portugal



The ‘Choose Beans’ project began as an internship work, which proved to be an important consumer communication tool, promoting food education and extremely healthy and environmentally friendly choices. It is important to keep looking for alternatives that appeal to consumers and motivate them to make healthier choices. Innovation is key to meet expectations if we want to make legumes an alternative. Helping to strengthen this path is one of our recent national policies. Despite some limitations, the evolution in the consumption of legumes as a TRUE alternative is quite positive, with the involvement of Eurest and the other partners being an essential part to success. That is why we ‘Choose Beans’.

13. The environmental footprint of rotations with and without legumes (TRUE WP5)

Marcela Porto-Costa, PhD researcher, Bangor University, United Kingdom

As part of WP5, Bangor University and Trinity College Dublin are responsible for evaluating the environmental impact, and savings potential, of legumes – through Life Cycle Assessment (LCA) of farm systems and legume value chains. The main goal is to provide accurate information for consumers on legume food footprints, and for policy makers on the potential for legumes to address agri-environmental challenges. For this evaluation, we will analyse different consumption pathways, comparing legume alternatives to, e.g. animal-based products. The main pathways are briefly described below.



- 1) Alcohol industry: the main goal of this pathway is analysing the production of gin made from pea, and beer from lentil. Protein-rich co-products are incorporated in the fish-feed industry, replacing imported soya. Fractionation may occur before or after brewing and distillation.
- 2) Pasta made of legumes: this pathway will analyse pasta made from legumes, such as chickpea, compared to traditional ones (from durum wheat).
- 3) Breakfast cereals: this pathway will analyse cereals commonly consumed for breakfast made from traditional cereal grains compared with legume grains.
- 4) The fourth pathway will analyse the consumption of cooked legumes and legume-based meat substitutes instead of meat.
- 5) The last pathway will compare the consumption of “conventional” meat/milk with the

consumption of meat/milk produced with legume-pastures or legume feed systems such as alfalfa and red clover silage. In this scenario, the benefit of replacing imported soya and palm oil kernels as animal feed will be considered.

Farm-level detail on the cultivation of legumes and grains will be the basis for the environmental assessment of legume value chains and diet change. Regarding the agriculture phase, Bangor University will analyse the environmental footprint of typical grain rotations in Europe and the potential benefits of the incorporation of legumes in these rotations. Legumes can fix nitrogen from the atmosphere, reducing the need for mineral fertilisation to the following crop in the rotation. They also can help meet European protein demand and avoid import from other countries, for example, the import of soybean from Brazil. These factors are likely to reduce the carbon footprint of animal production, among other environmental impacts. To calculate the LCA of all pathways, good farm level information is essential. First, the main current farm typologies will be defined across the three different agro-climatic zones of Europe, to understand the typical rotations and the potential areas and typologies for higher integration of grain-legumes rotation or intercropping. To assess the environmental footprint of each rotation analysed, it is necessary to obtain representative data of all inputs, management practices, yields, and nutrient balance. Once the footprint of the rotations systems is calculated, the footprint will be added to industrial processes involved in the legume-food value chains.

Data from specific grain-legume farms and specific legume-processing industries are welcomed. Thus, please contact us if you are willing to contribute.

14. Regional legume situation in a globalised market with other alternative trends for (protein) food supply (TRUE WP3)

János Petrusán, IVG Institute for Cereal Processing GmbH, Nuthetal OT Bergholz-Rehbrücke, Germany

Several studies are analysing different individual protein sources for nutrition from diverse plants, groups of plant or even alternative, so-called emerging protein sources. The presentation focusses on the economic facts and trends observed within the legume supply chain as an emerging palette of the protein source. The entire problematic is presented, starting with protein sources, followed by market situation and future trend analysis, and including a nutritional quality comparison of different proteins derived from diverse sources. We have tried to highlight the current evidence related to protein-rich vegetal and non-vegetal sources and the pathways of their valorisation in the view of consumer demands, as well as to highlight trends in protein food security and consumption for the next decades. We also provide the case study briefing of IGV's pea-based product marketing strategy which shows that legumes may have a bright renaissance when they are complemented with other vegetal sources.



15. Experiences from the previous TRUE Mediterranean LIN Workshop (TRUE WP1)

Marta W. Vasconcelos, Principal Investigator and TRUE WP3 leader, Catholic University of Portugal

The first TRUE stakeholder workshop for the Mediterranean region took place in April in Athens. The starting point of this talk was presenting the current (un)balance in the Mediterranean diet, that is legumes are eaten less and less. In parallel, childhood obesity is increasing in Mediterranean countries. The reasons for the decline of legume consumption in modern diets include the fact that many people do not know how to cook legumes, the difficulty of poorer families to transition from cheap (unhealthy) available foods to healthier (and often more expensive) alternatives, and the time to prepare healthy meals, which is not aligned with current lifestyles. In addition, children frequently do not like the pulse texture or flavour. Luckily, new products catered for kids and small toddlers, as well as more dishes with legumes are starting to appear in store shelves across Europe, and more dishes with legumes are becoming available in regional markets and restaurants. In fact, the numbers given in the presentations about innovations in legume consumption and processing were promising. And



importantly, the legume cultivation area in Greece increased in the years 2014-2017 for common beans (52%), lentils (145%), chickpeas (113%) and faba bean (532%), starting from a very low level. The importance of locality of legumes was also highlighted at this meeting: the aim is to integrate legumes in short supply chains instead of creating thousands of food miles. An example was visited during the workshop, where a farmer's community had invested in a packing facility and selling their products directly for a fair price. The conclusion drawn was to work on closing the knowledge gaps in production and consumption.

16. Experiences from the TRUE project

Karen Hamann, Institute for Food Studies (IFAU), Denmark

This presentation described how IFAU had become involved in the TRUE project and my roles on the project. I am a WP leader (WP4, Markets and supply chains), and carry out four case studies. With my background in applied market research and business development, my case studies are framed around food markets, feed markets, the food service market and the global market for peas. Since the start of the TRUE project in April 2017, I have been inspired to look for legumes "everywhere". I look for legumes in the field, in products, in market descriptions, and recipes. I have learned that new legume-based foods need to taste good if they are to be accepted by consumers. I would go so far as to say that the TRUE project has inspired me to take a strong interest in legumes and actively use legumes and legume-based products.



17. Experiences from the previous TRUE Continental LIN Workshop (TRUE WP1)

Henrik Maäß, Research Centre for Global Food Security and Ecosystems, University of Hohenheim, Germany



The first Continental Legume Innovation and Networking (LIN) Workshop was organised as a Multi-Stakeholder-Workshop with participants from the whole value chain, dealing with all kinds of legumes, mainly from the food sector, organic and conventional. The workshop was co-hosted by three German legume model and demonstration networks (beans and field peas, lupin, soybean). They are the main parts of the German protein strategy. Some highlights of the workshop were the 23 poster-presentations, a legume-based lunch, the exhibition of new legume-based products and machinery for legume processing and finally a field trip to a lentil growers' cooperative of 90 farms with processing and packing facilities and a shop, where participants gathered additional information about setting up legume value chains. In breakout groups the participants answered the question, "which changes are needed for more legumes in Europe?".

Answers from the production perspective, included:

- the installation of regional legume networks;
- more monetary incentives for legume production;
- better communication between farmers and researchers;
- more education and knowledge about legumes, also in extension services
- encourage agroecology as fundamental means to achieve sustainability; and,
- founding producer groups to get better prices and create synergies.

From the market's perspective, the main answers were:

- more and better consumer education to change the consumer habits;
- better transparency of legume markets;
- increased and more effective marketing activities; and,
- decentralised processing sites and trade infrastructure.

The policy" perspective highlighted:

- include legumes and healthy nutrition in the education plans of all children;
- extend this initiative (and education on principles of agroecology, above) to young farmers;
- reform of the Common Agricultural Policy towards better conditions for legumes;
- improve trade- and research-policies to support organic and small-scale farming;
- establish national nutrition- and diet-guidelines; and,
- align these with policies coherent regarding climate change mitigation.

All outputs of the meeting can be found on the TRUE website: <https://www.true-project.eu/lin-workshops/continental/documentation>

18. Was industrialisation of the food system responsible for the demise of legume cultivation in Europe?

Pete Iannetta, TRUE coordinator, The James Hutton Institute, UK

Legumes deliver nutritious food, feed and can support crop rotations in the absence of synthetic nitrogen fertiliser. It is therefore not surprising that legume consumption in Europe is high. However, most legumes consumed in Europe are from imported sources. Therefore, legume production in Europe is very low, and European food systems are highly dependent on human-made agrochemical use, including synthetic nitrogen fertiliser. In Scotland, the decline in legume cropping preceded the introduction of synthetic nitrogen fertiliser use by several decades. We suggest that the decline in legume cultivation was initiated with the need to industrialise the food system, and this was driven from around the 1900s by several compounding factors including war-times. It is likely that this pattern is mimicked throughout Europe and the Westernised world, and therefore I am led to ask: *why did this happen? Moreover, ‘what transitions may have occurred in the various sectors that comprised the value chains at that time - from cropping system to consumer behaviour?’*. Better insight into how we arrived at the current food system paradigm will inform transitions paths to more sustainable alternatives.



DAY 2 – Legume Innovation and Networking Workshop
12 September, Budapest Business School – University of Applied Science



1. Background of the TRUE project

Pete Iannetta, TRUE coordinator, James Hutton Institute, UK

TRUE's perspective is that the scientific knowledge, capacities and societal desire for legume supported systems exist but that practical co-innovation to realise transition paths have yet to be achieved. TRUE presents 9 Work Packages (WPs), supported by an *Intercontinental Scientific Advisory Board*. Collectively, these elements present a strategic and gender balanced work-plan through which the role of legumes in determining how the '*three pillars of sustainability*', '*environment*', '*economics*' and '*society*' may be best resolved.

TRUE realises a genuine multi-actor approach, the basis for which are three *Regional Clusters* managed by WP1 ('*Knowledge Exchange and Communication*', University of Hohenheim, Germany), that span the main pedo-climatic regions of Europe, designated here as: *Continental*, *Mediterranean* and *Atlantic*, and facilitate the alignment of stakeholders' knowledge across a suite of 24 Case Studies. The Case Studies are managed by partners within WPs 2-4 comprising '*Case Studies*' (incorporating the project database and *Data Management Plan*), '*Nutrition and Product Development*', and '*Markets and Consumers*'. These are led by the Agricultural University of Athens (Greece), Universidade Católica Portuguesa (Portugal) and the Institute for Food Studies & Agro Industrial Development (Denmark), respectively. This combination of reflective dialogue (WP1), and novel legume-based approaches (WP2-4) will supply hitherto unparalleled datasets for the '*sustainability WPs*', WPs 5-7 for '*Environment*', '*Economics*' and '*Policy and Governance*'. These are led by greenhouse gas specialists at Trinity College Dublin (Ireland; in close partnership with Life Cycle Analysis specialists at Bangor University, UK), Scotland's Rural College (in close partnership with University of Hohenheim), and the Environmental and Social Science Research Group (Hungary), in association with Coventry University, UK), respectively. These *Pillar WPs* use progressive statistical, mathematical and policy modelling approaches to characterise current legume supported systems and identify those management strategies which may achieve sustainable states.

A key feature is that TRUE will identify key *Sustainable Development Indicators* (SDIs) for legume-supported systems, and thresholds (or goals) to which each SDI should aim. Data from the *foundation WPs* (1-4), to and between the *Pillar WPs* (5-7), will be resolved by WP8, '*Transition Design*', using machine-learning approaches (e.g. *Knowledge Discovery in Databases*), allied with *DEX* (*Decision Expert*) methodology to enable the mapping of existing knowledge and experiences. Co-ordination is managed by a team of highly experienced senior staff and project managers based in The Agroecology Group, a Sub-group of Ecological Sciences within The James Hutton Institute.

2. Legume consumption in Hungary

Anikó Juhász, Deputy State Secretary, Ministry of Agriculture, Hungary

Legumes are necessary for a healthy planet, they have a positive nutritional effect on our food, and they are also good for our soil, one of our basic natural resources. Hungarian agricultural policy aims to support high value-added agricultural sectors of vegetable and fruit production, animal husbandry and food processing. Hungary is a country with a firm GMO-free policy and truly believe in a competitive and sustainable European food production based on this policy. Every initiative which helps us to substitute GMO protein import is more than welcome. Agricultural Ministry has a protein programme which provides an extra subsidy to produce protein crops and which focuses on the research agendas of our background institutes, NAIK and AKI. CAP has strict rules, thus from 2015, we started to provide support directly linked to production (voluntary coupled support). Also, we prepared a programme which does provide subsidies for legumes. Furthermore, we set the rules of greening (from 2015) to be able to produce legumes (soy) on areas of ecological focus. Legumes were produced on 104 thousand hectares, 2.4 % of our arable land, soy is the main protein crop (almost 60 % and increased by 40 % from 2015) but green peas and dry peas are also important. Our farmers are rational entrepreneurs who produce what is worth producing. To influence their decisions on what to grow, we have a few regulatory and subsidiary tools which we put into action to increase legume / protein production. On the other hand, the real power is in the hands of consumers. If the market demand for legumes increases considerably, our farmers will react and produce even more. Having the consumers on the farmers' side makes policy work easier. The TRUE project is important as it tries to make legume consumption sexy and thus help us and our soil becomes healthier. Policy work is a great challenge, but during the time of the conference, you will participate in an intellectual and culinary adventure which, I am sure, will be even more fantastic.



3. Legumes and novel legume products (WP3)

Marta W. Vasconcelos, principal investigator and TRUE WP3 leader, Catholic University of Portugal

Legume grains are plant foods that have been present in traditional diets across the globe for centuries, and their importance as ingredients in processed food products has increased exponentially in recent years. The health benefits of legume grains stimulated the UN FAO to nominate 2016 as the 'International Years of Pulses' under the slogan 'nutritious seeds for a sustainable future.' This recognition stems from the fact that legume grains are environmentally beneficial, and nutritionally rich in protein, fibre, vitamins, phytochemicals and essential minerals. Moreover, their natural diversity in terms of colour, shape, taste, nutritional composition and processing characteristics offers great potential in developing novel legume products that may be targeted to different types of consumer and population segments. As the demand for foods based on plant protein is growing 6-7 % annually, and most of the plant proteins are consumed in a processed form, there is a strong role for legumes in fulfilling this role. The presentation discusses the importance of a proper germplasm evaluation of grain cooking and processing characteristics, as well as the applications of legumes in high value food niches (such as in specialised nutrition, or as meat replacers) and keeping in mind the role of legumes as a food commodity *per se*. This dual utilisation of legume grains is necessary and must embrace when aiming at increasing legume consumption and acceptability. The presentation demonstrates how legumes can be successfully incorporated into demitarian, sustainable diets, providing potential health benefits, and increasing their acceptability. Finally, the presentation highlights legume product development for food applications within the scope of the TRUE project, but also by other players in the global food sector. We hope that this talk will provide a summarised insight in the role that common beans, chickpeas, lupins, lentils or even soybeans may play, in helping the EU reduce the amount of animal protein intake, and in the future, contribute to more sustainable and healthy food systems.



4. Nutritional Knowledge in Hungary

Antal Emese, Nutritionist, TÉT Platform, Hungary



Diet and lifestyle related diseases, e.g. CVD, cancer, account 50-70 % of overall mortality world-wide. Inappropriate nutrition and lifestyle result in unfavourable health status of the population, and high mortality rate. Balanced nutrition is therefore very important, and legumes play a significant role in this. Legumes are an excellent source of protein, dietary fibre, carbohydrates and minerals and have positive effect in the prevention of some diseases. Diets rich in legumes may decrease the risk of type 2 diabetes by improving blood glucose control, decreasing insulin secretion, and delaying the return of hunger after a meal. Increasing bean consumption improves serum lipid and lipoprotein profiles. Legumes are rich in several compounds that could potentially reduce the risk of certain cancers. Although the results of epidemiological studies are too inconsistent to draw any firm conclusions regarding legumes intake and cancer risk in general.

In the position paper of the Academy of Nutrition and Dietetics, we can find, that, "*appropriately planned vegetarian, including vegan, diets are healthful, nutritionally adequate, and may provide health benefits in the prevention and treatment of certain diseases*". These diets are appropriate for all stages of the life cycle, including pregnancy, lactation, infancy, childhood, adolescence, older adulthood, and athletes. Plant-based diets are more environmentally sustainable than diets rich in animal products because they use fewer natural resources and are associated with much less environmental damage." (*J Acad Nutr Diet. 2016;116:1970-1980*). Although legumes are an important part of traditional diets around the world, they are often neglected in typical Western diets.

5. Market potential – opportunities for legumes in the food service (TRUE WP4)

Karen Hamann, Institute for Food Studies (IFAU), Denmark



Food service accounts for a large share of the food market, as it provides 25 % of the meals served in Europe. Across the diverse range of food service outlets (e.g. hospitals, restaurants, canteens, fast food stores etc.) there is a significant trend for featuring pulses and plant-based meal items on the menus. The number of vegan restaurants is increasing, and major hamburger chains collaborate with producers of plant-based burgers. Despite the strong focus on new menus, new plant-based food items or vegan alternatives, peas and beans are still important items in traditional dishes across Europe. The conclusion is that the food service sector is a major provider of traditional dishes and modern plant-based menus and, at the same time serves to educate consumers about new types of food including pulses.

6. Consumption policies for a legume-supported food system in Europe (TRUE WP7)

Bálint Balázs, ESSRG, Hungary

There is an increasing need for an active science-policy interface to support legume-based agri-food systems. The EU H2020 funded project TRUE (TRansition paths to sUstainable legume-based systems in Europe, www.true-project.eu) aims to enable co-innovative environments to help realise policies which will adequately support current and future food and nutritional security challenges *via* the great use of legumes and legume-based-products. The marginal role of legumes in agri-food systems illustrates '*pars pro toto*' a complete picture of agri-food systems which as 'locked-in' to unsustainable states of operation that systematically obviate the true economic, social and environmental costs of current production and consumption patterns. Legume production and consumption would provide clear opportunities for synergies, as sustainable diets might be a policy goal that is most widely acknowledged. Also, it must be recognised that transition is required throughout the agri-food chain and simultaneously in collective action. Price support or other economic incentives can no longer counterbalance the low profitability of legumes. New socio-technical innovations to foster cropping system diversification and legume-based products generated and consumed by all sectors of provenanced agri-food systems are prerequisites of the purposive transition with the engagement of state and non-state actors. Legumes require an enabling policy environment to meet current and future food and nutritional and health security challenges. Understanding policy constraints and incoherencies are the first steps in engaging multiple stakeholders and decision-makers in the creation of a more favourable policy and governance context. Therefore, a wide range of interested parties such as farmers, advisors, breeding businesses, non-governmental organisations, and including both the conventional and the organic sector, require representation within 'Pulse Europe', a science-society-policy interface to be established by the TRUE project.



3.4 Poster abstracts

The posters have been uploaded to the TRUE website [here](#). Annex III provides a list with direct links.

1) Public food procurement reform in Hungary: A true window of opportunity for pulses? (TRUE WP7)

Eszter Kelemen, Bálint Balázs, Diána Szakál
ESSRG, Hungary

Public caterers provide food for over 1.1 million Hungarian people (more than 10% of the whole population) every day (Horváth 2016). Therefore, public food procurement has a critical role in making food consumption healthier and more sustainable. Recent reforms and bottom-up initiatives have been targeting such a sustainable shift from different angles, ranging from governmental regulations to gastronomy-led projects and NGO initiatives. A key argument for the changes is the high prevalence of obesity and nutrition related health problems within the Hungarian population (and among children), but other reasons (e.g. securing farmers' livelihood through localised food systems) are named, too. The poster will map some of the major initiatives, e.g. the 37/2014 Decree of the Ministry of Human Resources, the Mintamenza (Canteen Best Practice) Programme, and the Menzaforradalom (Canteen Revolution) by Greenpeace –, and analyse whether they have created more space for pulses in public catering. Some hints about how the Hungarian society perceives the reforms will also be shared, based on a media analysis. We found that ongoing reforms are trying to create a favourable environment for healthier public food procurement, although the approach is more control-oriented than empowering. Dried legumes are included now in the menus once in every two weeks, but meat products are considered as the major protein source. Bringing pulses to the forefront is still to come in Hungarian public catering.

2) Grain legume research at NARIC Szeged

Melinda Tar*, István Kristó

National Agricultural Research and Innovation Center, Department of Field Crops Research, Alsókikötő sor 9.
Szeged, 6726-Hungary. *tar.melinda@noko.naik.hu

Climate change and the one-sided crop rotation system, which contain four main plants (wheat, maize, sunflower, rapeseed) without any legumes make it necessary to develop new technologies - involving legumes - for integrated cropping systems. This could also offer several benefits for agro-ecosystem, such as a valuable source of protein for food and animal feed, increased biodiversity and reduced nitrogen fertiliser application. The main goals of our group are the collection, preservation and maintenance of the genetic reserves of grain legumes (field pea, chickpea, faba bean and grass pea), and the morphological description and agronomic testing of sources. During our work, we selected highly adaptable varieties with exceptional quality for small take holders and for bigger farms. The use of molecular markers to characterize each breeding line enable us to identify their genetic background of quality and resistance properties. The measurement of protein and vitamin content of the breeding materials was also achieved using various analytical methods.

3) Legumes in schools

András Bitsánszky¹ – András Tóth^{1,2} – Csaba B. Illés²

¹InDeRe Institute for Food System Research and Innovation Nonprofit Ltd, Budapest, Hungary. ²Szent István University, Department of Business Economics and Management, Gödöllő, Hungary

Following the European trend, more and more children have their meals in canteens. As a result, all questions related to nutrition biology and school catering have come into the limelight. Legumes are well represented in Hungarian school catering since regulations forced the caterers to serve legume at least once in a ten schooldays period. Green pea, French bean, kidney bean, lens and yellow pea are the served regularly in various form. However, the regulations are moderately suitable to determine the real consumption, because pupils can reject or consume partly the served food. Therefore, limited information is available on the real quantity of consumed food and leftovers in schools. In 2017, a food preference survey was conducted in more than 80 Hungarian secondary schools. In this research, plate waste from the canteens was analysed according to the main ingredients. By analysing the served portions and the amount of plate waste, we estimated the real quantities of the consumed food. This presentation focussed on dishes containing legume ingredients only. Legume dishes were served in 26 schools for a total of 2,329 people (pupils and teachers) over the survey period. About 726 kg legume containing food were served, 474 kg were consumed, and 252 kg became food waste.

4) Environmental investigations and researches for enhancing the low-input management practices in Diverfarming project

Gizella Dezső^{1,2}, József Dezső³, Dénes Lóczy³, János Werner¹, Ferenc Tarjányi²

¹AKA Kft, 7773 Villány, Erkel F. str. 2, Hungary

²Nedel-Market Kft, 6078 Jakabszállás, Distr. III. 134, Hungary

³University of Pécs Faculty of Sciences, 7625 Pécs, Ifjúság str. 6, Hungary

This poster presents the scientific investigations of asparagus crop at Jakabszállás and vineyard in Villány as case study areas of the H2020 Diverfarming* project, Hungary. Case study no. 10 experimental plot of 1.3 ha with 28 rows of asparagus is located at Jakabszállás – Danube -Tisza Interfluve (Hungary). Case study no. 11 is located in Villány, on a loess-covered area the southern slope of Fekete-hill. Among the managing practices used (Case Study 10) are the foil coverage, crop rotation, mineral fertiliser and integrated pest management. The main environmental problems at Jakabszállás are wind erosion and drought hazard, lack of ground cover, poor soil quality, low soil organic matter content and water scarcity. At vineyard area, where the organic farming method was introduced, loss of biodiversity, tractor-wheel erosion and soil compaction were recorded. In the period 2018-21, the experimental management practices focus on the crop diversification, low-input land use such as intercrop in lines (*Achillea millefolium*), soil organic matter sequestration methods, etc.

*Crop diversification and low-input farming across Europe: from practitioners' engagement and ecosystems services to increased revenues and value chain organisation.

5) Crop diversification and environmental problems in the Danube-Tisza interfluve region

Marietta Rezsek, József Dezső, Dénes Lóczy

Doctoral School of Earth Sciences of the University of Pécs, Hungary

The research is focused on environmental problems and low input practices in sandy and loess-covered areas of the Pannonian pedoclimatic region within the framework of the H2020 Diverfarming project. This poster presents the investigations of asparagus crop at Jakabszállás, Hungary, with wind erosion and drought hazard. The experimental plot of 1.3 ha with 28 rows of asparagus is located at Jakabszállás – Danube -Tisza Interfluve (Hungary). Currently 7–10 years of monocropping system is used for food production. Among the managing practices used are the foil coverage, crop rotation, mineral fertiliser and integrated pest management. The main environmental problems which occur in this plot are the loss of biodiversity, wind erosion, lack of ground cover, poor soil quality, low soil organic matter content and water scarcity.

For diversification: we propose two alternatives:

D1: interrows cropped with field pea (for improving nitrogen balance);

D2: interrows cropped with oat for organic material enhancement and/or marketable produce

Link for further information: <http://www.diverfarming.eu/images/casestudy/CS10.pdf>

6) The study of genetic reserves of common bean landraces at the CPD, Hungary

L. Horváth, B. Horváth, G. Málnási Csizmadia, O. Szalkovszki

Center for Plant Diversity, Tápiószele, Hungary

The main goal of the research is to analyse the genetic reserves of domestic common bean (*Phaseolus vulgaris* L.) landraces to aid sustainable plant breeding and to ensure the conditions of healthy diet. The gene bank collection of common beans at the Centre for Plant Diversity is made up of 4,416 accessions. Of these, 3,096 are landraces, with 2,500 originating from Hungary and 596 coming from neighbouring countries. The present study provides details about the results of the examination of 669 randomly selected landraces that were handpicked from the reserves mentioned above. Their collection began in the 50's and peaked in the 1980's with 225 landraces gathered around that time. The main tasks in this initial part of the project were the biological and morphological description of the landraces, the evaluation of Rhizobium contamination and the multiplication of basic seed samples for the upcoming experiments.

This study is funded by the National Research, Development and Innovation Office as part of the SNN 120191 Project.

7) Genetic reserves of cowpea – Hungarian sandy hills – climate change: the study of an alternative legume

B. Horváth, L. Horváth, O. Szalkovszki
Center for Plant Diversity, Tápiószéle, Hungary

Climate change is compelling us to increase the productivity in our cultivation of field crops. This requires the emergence of new cultivars, and even new species, that are more adaptable to the changing conditions. Cowpea, a globally distributed legume in the Vigna genus with extensive information on its drought resistance, has the potential to achieve this, even in our country. The preliminary goal of the experiments set up in 2016 and 2017 was to compare the yield of 29 cowpea accessions in dry farming conditions. The soil that was used is sand that is typical to the Hungarian Sandy Hills. Yield comparison of the accessions revealed the difference in output (in both years) as well as the protein content and rhizobium occurrence.

8) Vegetarian experiences and eating habits of self-defined ovo-lacto vegetarians, vegans, and omnivores

Andrea Papp^{1,3}, Norbert Magyar², Andrea Lugasi¹

¹Budapest Business School, Faculty of Commerce, Catering and Tourism, Department of Hospitality, Hungary

²Budapest Business School, Faculty of Commerce, Catering and Tourism, Department of Methodology, Hungary

³University of Debrecen, Doctoral School of Food and Nutrition, Hungary

The problem of global climate change and the increasing environmental impact brought about new scientific disciplines interested not only in the nutritional impact of diets, but their environmental impact as well. Plant-based diets are in the focus of sustainable nutrition researches, due to their advantages in resource management and environmental impact. These diets contain less (or zero) animal-based products compared to average diet, and either way they tend to be rich in fresh or minimally processed plant-based ingredients. Vegetarian diets are plant-based diets that contain no meat or even no animal-based products at all. Well-planned vegetarian diets are confirmed to be healthy by many nutritional and dietetic organisations worldwide, however, there is still no resolution in Hungary. As there seems to be an increasing tendency in the interest toward vegetarian diets, the health care system, the food industry, and the catering sector must adapt. However, there is a lack of research about the Hungarian vegetarian population. Our investigation focuses on the lifestyle and eating habits of Hungarian self-defined ovo-lacto vegetarians and vegans. We compare nutritional and environmental traits of diets among self-defined ovo-lacto vegetarian and vegan women with similarly health-conscious omnivore ones. In the first phase, we made a descriptive cross-sectional analysis with online questionnaire. We were interested in lifestyle, motivation, self-defined health state, eating habits, and food frequencies. Vegetarian groups judged their actual health state to be better than omnivores, and they felt their health improving after going vegetarian. Although a big part of them reported unpleasant symptoms during the transition period. Many omnivores have tried some vegetarian diets, but they abandoned it for various reasons. As we expected, the consuming frequency of pulses, soy products, mushrooms, nuts and seeds were higher compared to omnivores. Vegans tend to cook for themselves the most and they visit the least

catering units. Among omnivores, the assumption that a vegetarian meal is especially healthy seems to be the strongest motivation to choose such meals in catering units, while these being cheaper than the non-vegetarian ones was the weakest motivational factor.

This research was supported by The Center of Excellence in Sustainable Catering – BGE.

9) The value chain of legumes in Hungary- a qualitative analysis

*Katalin Rethy, agroecologist/ vegetable farmer
Szezon Kert / ESSRG, Hungary*

A qualitative analysis of the Hungarian legume sector was conducted with the participation of 17 stakeholders in the field. The goal was to gain oversight on the value chain and specifically on the barriers and opportunities present in the sector and long termaim to strengthen cooperation among members of the value chain. Interviewees were selected from a wide variety of fields, such as research, policy, plant breeding, production, communal catering and retail. Results show that Hungarian climatic and soil conditions make it possible for a wide variety of legumes to be grown both for human and animal consumption. A good selection of locally adapted varieties and the knowledge for production is present in specialized research institutes for developing production, processing and consumptions of legumes in Hungary. However, currently the sector is not living up to its potential; and in some fields it is even degrading.

10) The place of legumes in small scale agroecological production- experience from Szezon Kert

*Katalin Rethy, agroecologist/ vegetable farmer
Szezon Kert, Hungary*

Consumer perception of legume products is often based on negative stereotypes concerning digestibility, preparation time and lack of variety in recipes and use. Leguminous plants play an important role in all scales of organic production, therefore it is necessary to develop consumption and degrade those negative stereotypes- starting with offering a wide variety of legume types, products and showing ways of varied uses. The role of leguminous plants in a small scale agroecological vegetable production, alternative fresh products and consumer education will be presented with examples from Szezon Kert.

11) Soybean production in Italy

Tiziana Centofanti

Central European University, Hungary

Italy is the first producer of soybean in Europe. The reason for the high production of soybean is analysed in the context of relevant European and national policies that may favour soybean cultivation over other crops. Climatic and ecological conditions, as well as agronomic know-how, are other factors considered in the analysis. The history of soybean production in Italy reveals that Italy has been at the forefront of non-GMO soybean production since 1980. Today this trend is being supported and facilitated by the demand for high-quality GMO-free products (*i.e.* meat, dairy, etc.).

12) Making Legumes a Big Player in the Snack Market

Simon Vogt & Emilie Wegner

Hülsenreich, Germany

Hülsenreich is a young food start-up looking to bring snacks made from legumes to the German market. By offering legumes in modern and sought-after forms of consumption, Hülsenreich seeks to establish a healthy and sustainable alternative to conventional snacks and give legumes a bigger role in consumers' choices. From a consumer perspective sustainability is often a topic that is associated with an unpleasant change of lifestyle. With legumes provided as protein-rich snacks full of dietary fibre we give the consumer the opportunity to combine sustainability with indulgence and at the same time personal health, a topic far more graspable to most people. Legumes are known to most people only as a part of traditional dishes. As these traditional dishes are in decline in the modern world, we are aiming to help legumes survive the transition towards current consumer demands. Legumes being very nutritious makes them a perfect candidate for snack products that can also be seen and eaten as a small meal on the go, which has been in increasing demand in recent years. Starting with tortilla chips and accompanying dips, all based on legumes, we plan to later move on to a wider array of legume-based products, both savoury and sweet to establish and normalise legumes in the consumers' eye as a solid part of the everyday modern diet instead of as just a once-in-a-while ingredient in cooked meals.

13) Development of Protein-rich Food based on Extrusion (TRUE WP3)

Uwe Lehrack, Janos Petrusan

IGV Institute for Cereal Processing GmbH, Arthur-Scheunert-Allee 40/41, 14558 Nuthetal, Germany

In recent years, the nutritional trends have changed worldwide. The increase in meat consumption *per capita* in developing countries and a new trend in reducing meat consumption in industrialised countries have led to an increase in demand for plant-derived proteins and derived foods. Reduced meat consumption needs to be replaced by a high-protein diet based on plant proteins, resulting in a growing market for new products. The best-known type is soybean, but the allergenic potential as well as the fear that GMO soy products could be imported are unsettling many European consumers.

Therefore, a new search for other regionally produced legumes is emerging. IGV GmbH has several years of experience in processing protein-rich vegetal foods. For several years, we have been working on the characterisation of the processing properties of legumes and the development of new products. The aim of the development work is to produce products which are delicious, healthy, free from allergens, gluten, GMO and rich in protein and fibre. The resources are flours, protein-isolates, protein-concentrates of green peas, yellow peas, fava beans and lentils. The main technologies, we work with are extrusion, pasta making and baking. Products are for example high-protein pasta, peas flakes, crispies for the production of meat balls and muesli, or nuggets and balls as snacks

14) An index combining environmental and nutritional aspects of foods (TRUE WP5)

Dr. Michael Williams, Sophie Saget, Sabhdh Sheeran

Trinity College Dublin, Ireland

Sustainably intensifying food production and implementing healthy diets are two major global challenges to tackle agricultural dependence on resources, soil degradation, greenhouse gas emissions, nutrient pollution and inefficiency, and the spread of unhealthy diets which are linked to type 2 diabetes, coronary heart problems and colon cancer (Huxley *et al*, 2009; Norat *et al*, 2005). It has been shown that increasing legume production and consumption provides a solution to both these issues (Foyer *et al*, 2016). Consumers are increasingly aware of the role of nutrition in health and are seeking direction to adopt a healthy diet, and popularities of different diets vary among the globe (Nielsen, 2015). Currently, there is no effective index that combines environmental and nutritional aspects of food products. This research linked environmental impacts with nutrition to advise consumers and policy makers to develop optimal diets. An extensive database of foods that combines nutrition with global impacts through the Nutrient Rich Foods (NRF) index (Drenowski *et al.*, 2005; 2009; Drenowski, 2010) and Global Warming Potential (GWP), and local impacts through NRF and Eutrophication Potential (EP), was developed. NRF is an index that integrates nutrient contents to encourage and limit of food items as a proportion of a person's daily recommended intake. GWP indicates the amount of heat a greenhouse gas is trapped into the atmosphere, while EP expresses the excessive enrichment of water. We performed a meta-analysis of food Life Cycle Assessments (LCAs) at the farm gate level and compared it with Poore and Nemecek's meta-analysis (2018) of the same foods at the store gate. A database with NRF9.3 and NRF11.3 of these foods was subsequently built and combined with the environmental indices to form the "Nutrient Richness Environmental Impact index" (NREI). We found that there is a large variation of environmental impacts between farm and store gates, implying that post-production stage plays an important role on impacting the environment. Animal products showed the lowest score in the NREI, while legumes scored the highest.

15) Retailer-producer quality chains and innovations (TRUE Case Study 9)

Karen Hamann

IFAU, Denmark

The assortment of food and drink products made with legumes is very wide and with traditional products such as canned, fresh and frozen legumes as the main traded goods. New products play a key role in driving market dynamics. Bringing new products (food and drink) made with legumes into the retail market can provide a big challenge for large as well as small producers. A thorough understanding of the supply chain, market power and, market drivers are crucial for decision making about entering the market with a new legume-based product. By analysing the food retail markets in Denmark, Germany, the UK, the Netherlands and Greece, this case study provides detailed findings about retailer-producer quality chains for legume-based products.

The case study builds on interviews with key market actors; observations of assortment, prices, brands and products in retail stores; and analysis of retail market structures and market dynamics. To identify and understand the differences between the countries under study, additional interviews are gathered from the market sessions at the regional Legume Innovation Network meetings. Challenges related to product development and marketing in practice are investigated in collaboration with North Jutland Food Cluster, thus using Denmark as a model country.

Across the EU, the key market driver for having more legumes in the food chains is health. This is instigated primarily as a growing demand for plant-based protein to reduce consumption of animal protein, and secondly as a choice of food to match the consumer's lifestyle such as a flexitarian diet with a convenient access to relevant products. Food manufacturers aim to launch new or reformulated products into the retail market that cater to consumers' motivations for food choice, making "health" a key quality criterion for marketing new products. Health is not a "one-size-fits-all" quality criteria, as health may be defined by attributes such as vegetarian, vegan, organic, low-fat, fresh or otherwise. An important conclusion is that the market for innovative legume-based products is driven by a strong interest in plant-based diets and a continuously widening assortment of products to meet the consumers' lifestyles especially targeting the segments of health and convenience.

16) Legumes in public and private food service (TRUE Case Study 11)

Karen Hamann

IFAU, Denmark

Food service accounts for approximately 25 % of the food consumed in the EU. Food service includes the public sector (hospitals, school meals, army etc.) and the private sector (company canteens, restaurant chains). Procurement of food items for the public food service market is subject to government regulations and plans including the Green Public Procurement (GPP) Criteria of the EU. Procurement strategies for food in private and public food service outlets can be influenced by schemes such as the Danish Organic Eating Label. This case study investigates how government regulations and, public and private schemes can impact the procurement strategies in the food service sector towards a greener purchasing of food. The Organic Eating Label was introduced by the Danish government in 2009 to promote organic food in the private and public food service

outlets. By 2018, nearly 2,500 public and private outlets were certified with a Gold, Silver or Bronze status within this label. The status refers to the share of organic food in the total food purchase, hence a Gold label corresponds to an organic share of 70-100 % of organic food. Certified outlets have developed more green menus, reduced food waste, and purchase more seasonal produce. The case study builds on desk research, interviews with key market players and regulators and, observations of menus, purchasing lists, and procurement criteria. Denmark and the UK are used as model countries, and the Green Public Procurement strategies are investigated at EU level and for the model countries. GPP is an EU initiative instigated as a management tool to increase sustainability through the outlining of framework conditions for government procurement. Food is included as one of the categories in the Green Public Procurement initiative in line with building materials, medical devices etc. The GPP lays down the detailed requirements for public procurement contracts and for food, the GPP includes specifications for numerous food categories. Yet, legumes are not mentioned at all. This paves the way for investigating how legumes are used in the public food service sector, how legumes are mentioned in procurement contracts, the drivers for sustainability as a purchase criterion and the role of schemes in driving the food service market. The findings will point to policy issues to be addressed to achieve greener food procurement strategies with legumes playing a central role.

17) Situation of legumes in Croatia (TRUE Case Study 16)

Jurka Topol

REDEA, Croatia

REDEA's Study is focused on the research of current state of legume production and on defining the most important factors that affect the development of legume production processes in Croatia. The general aim is to encourage and stimulate farmers to increase cultivation and production of these important crops and for consumers to raise awareness of their importance in a healthy diet. This aim will be achieved through development of policy recommendation framework for sustainable development and through the creation of the prerequisites for setting up the first Croatian Legume Innovation Network. At the end of the project implementation, all members of the Croatian Legume Innovation network will become part of an international network that will ensure the transfer of information and examples of good practices from different EU countries. Hence, members of the network will have the opportunity to acquire the specific knowledge and skills necessary to incorporate legumes into their production systems and processes to enhance their current business.

18) Stakeholder perspectives on transition paths to legume-supported agri-food systems (TRUE WP1)

Pietro P.M.¹, Balázs, B.², Debeljak, M.³, Gomes, A.⁴, Hamann, K.T.⁵, Howard, B.⁶, Kelemen, E.², Kolmans, A.⁷, Maaß, H.⁷, Ntatsi, G.^{8,9}, Savvas, D.⁸, Shrestha, S.¹⁰, Styles, D.¹¹, Tran, F.¹, Toma, L.¹⁰, Trajanov, A.³, Vasconcelos, M.W.⁴, Vickers, R.⁶, Williams, M.¹², Squire, G.¹

¹James Hutton Institute, UK

²Environ Social Sci. Res. Group (ESSRG), Hungary

³Jozef Stefan Institute, Ljubljana, Slovenia

⁴Universidade Católica Portuguesa, Porto, Portugal

⁵Inst. Food Studies Agroindust. Develop., Denmark

⁶Processors Growers Research Organisation, UK

⁷University Hohenheim, Germany

⁸Agricultural University Athens, Greece

⁹Institute Plant Breeding Genetic Resources, Greece

¹⁰Scotland's Rural College (SRUC), UK

¹¹Bangor University, UK

¹²Trinity College Dublin, Dublin, IE

Nitrogen (N) is essential for food production, yet agriculture's high GHG footprint (25% of total) is mainly a function of two gases. Firstly, nitrous oxide (N_2O) from the application of synthetic nitrogen fertiliser (SNF) - 50% of applied SNF is lost. Secondly, methane (CH_4), from SNF demanding crops that are fed to cattle. Inexpensive and easily accessible SNF drives the high-production and - pollution of intensive agriculture. The wider food system also presents polarised capacities to process mainly SNF-dependant commodities, and with negative impacts on public health through encouragement of unsustainable diets. In parallel with this socio-economic paradigm, is the demise of food systems supported by biological nitrogen fixation (BNF), *via* legumes. Yet, legume-supported production can significantly lower GHG emissions and deliver high quality food. A major challenge is therefore to help identify and follow transition paths to more sustainable legume-based food systems in partnership with actors across the supply chain.

No. 19) FIT4FOOD2030 – Towards Food 2030: future-proofing the European food systems through Research & Innovation

4. Outputs of discussions

4.1 Summary of Stakeholders' Views

Stimulating factors for the Production of Legumes

- Reducing imports, sufficient production
- Reduction of fertiliser inputs
- Low input crop rotation schemes
- Traceability: “where is it from?”
- Invest in farmers’ education/awareness – work closer –

Barriers in Legume Production

- Lack of knowledge for farmers
- Difficulties in working with local producers, import/export always miles
- Many farmers are mixing both traditional methods and tested (scientific) methods to achieve their goals. At times, this is elusive.

Opportunities in Markets

- Environmental and sustainability as a target to “catch” the consumers
- Packaging with the instructions on time to spend on preparing/cooking
- Think easy ways to eat legumes – “fast” legume alternative, e.g. hamburgers, meatballs and appetisers
- Promote access and consider displaying recipes on packages

Stimulating factors for the demand for legumes

- New products catered for kids and small toddlers.
- More dishes with legumes in markets and restaurants

Hampering factors in the demand for legumes

- Many people do not know how to cook legumes
- The cost for a poor family to switch from cheaply available food
- Time to prepare meal needs minimised
- Children often do not like pulse texture or flavour

Changes Opportunities in Policy Change

- Public procurement
- European Plant Protein Strategy should be extended to develop similar plans nationally and regionally
- Consumers information needs developing to increase awareness of alternatives to ‘every-day food’ (made from less nutritious and synthetic fertiliser dependant commodities only)
- Include legumes as an alternative of protein source in meat products
- Include pulses in all EU “food pyramids” (i.e. public information on healthy eating)
- Consider recommending a % legumes for pulse-based products in public menus
- Demand that legumes are included in menus for public-schools, -hospitals etc...
- Encourage lower taxes for sustainable products/legumes

Barriers to Policy Change

- Too much focus on production
- No clear policy on minimum legume availability in schools, hospitals etc.
- Taxes in miles done in legume transport in import/export

4.2 Stakeholder World Café Sessions - breakout-group reports

Stakeholder World Café with discussion focussing on two main questions in three parallel groups:

- *What circumstances facilitate and hinder legume consumption?*
- *Which next steps are needed for a short, medium and long-term improvement?*

Group 1

Facilitators: Karen Haman, Gabor Bertényi

As a general approach, the group tried to **identify potential points of intervention** along the whole value-chain, that are actual leverage points, where changes can be made. The group has been looking for transferable and adaptable patterns with the potential of scalability and concluded that there is no 'one fits all' solution (from local grassroot-actions to the reforms of CAP). However, the end user/consumer plays a very significant role in the game. Accordingly, the group focused primarily on **communication, promotion, dissemination** and awareness-raising aspects.

Notable initiatives:

- 2016 International Year of Legumes (FAO)
- 2017 Ingredient of the Year of the Balaton region: 'Töreki bean'
- Supermarkets having special weeks, featuring regional goods + eventual partnerships with the retailer
- Naked Chef series (Jamie Oliver)
- Italy: medical practitioners advising patients with healthy diet options (as opposed to cold cuts and prosciutto)

How? (problems, barriers)

- What makes a good influencer?
- How could critical mass and real turning points be achieved?
- Credibility and authenticity are critically important (success of David Attenborough).
- How can we find the right rhythm, on top of the wave of a given trend?
- Combination of the timing of different scales of interventions ...
- Every implications and aspect of a given promotion campaign should be taken into account, in order to avoid unintended consequences.

What is next?

As a strong opportunity to intervene effectively, with considerable impact on the end-user, the group scrutinised the case of medical practitioners in Italy and concluded that **insurance companies** (both private and state-based) – having the right financial incentives - might be interested in **getting involved in health-campaigns**, providing a **business-based approach** for further elaboration is possible.

Group 2

Facilitators: Bálint Balázs, Eszter Kelemen

Factors enabling the production/consumption of legumes.

- Production:
 - short vegetation period of legumes;
 - additional advantages for production (N fixing);
 - relatively easy to grow in home gardens (although this depends on the species/variety);
 - direct contracts with farmers or farmer communities are getting trendier.
- Processing:
 - high nutritional benefits; and,
 - the taste is very diverse.
- Retail and marketing
 - an increasing number of farmers- and organic-markets which could provide suitable distribution channel for legumes;
 - increasing demand for local markets;
 - increasing demand for more transparency in public kitchens: redefine public kitchens as a place to experiment and learn; and,
 - trends in marketing
- Consumption (cultural factors):
 - growing demand for healthy diet/lifestyle;
 - relatively cheap, compared to meat dishes;
 - excellent reputation of beans in Hungarian culture (e.g. Borsószem királykisasszony, Égig érő paszuly, Babszem Jankó); and,
 - quick and easy to prepare food from half-prepared material (e.g. canned legumes).

Factors hindering the production/consumption of legumes.

- Production and inherent qualities:
 - agrotechnological difficulties of production (irrigation might be necessary, lower yields than other crops); and,
 - unpredictable yield, uneven quality.
- Processing:
 - unfavourable sensory characteristics (not so pleasant as other types of food); and,
 - a few traditional dishes are available in restaurants.
- Retail (economic and market factors):

- price of legumes and availability;
- limited choice of products;
- the lack of attractiveness of legume-based products (marketing elements are mostly poor); and,
- lack of attractive packaging.
- Consumption (socio-cultural factors):
 - the faster lifestyle of consumers (changes in cuisine);
 - the dominance of meat in protein intake (classic Hungarian cuisine);
 - the myth of “meat above all” in schools and kindergartens; and,
 - bad habits, weak traditions and history of eating legumes in some cultures.
- Information related factors:
 - lack of proper information on the advantages, cooking times and recipes for legumes; and,
 - lack of knowledge of cooking.

Possible solutions to significant challenges:

- (re-) define beans as commons;
- integrate beans into local gastronomy and tourism;
- make legume consumption more convenient for the consumer (dry *versus* canned; quick *versus* tasty);
- make beans look more special;
- change costs, not the incentives; and,
- increase the knowledge base on healthy food and the impacts of having more legumes in your diet, including:
 - education from the early ages; and,
 - provide good examples to follow (at home and in schools, preferably based on personal experiences).
- increase the cultural acceptance of legumes, including:
 - e.g. in Brazil beans are very typical, part of the everyday diet of people, one massive pot of beans is cooked for the whole neighbourhood (beans as part of the traditional culture and as the emerging sharing culture); and,
 - put legumes in public media (e.g. share recipes, create TV show).

Policy-oriented recommendations include.

- Tax differentiation: the favourably low tax on pork incentivises meat production – why not create an inverse incentive by supporting legume production by a lower tax rate?
- The policy of retail marketing: regulate the allowed position of healthy foods on book shelves (make them more prominent to consumers) → however this suggestion also raised the concern of policy having too much control over the retail sector.
- Public campaign for healthy eating broadens the knowledge of people on healthy food in general and organise campaigns for legumes like the ones for fruits and vegetables (eat fruits/veggies five times a day).

Group 3

Facilitators: Marta Vasconcelos, Pete Iannetta, Henrik Maaß

Options to affect legume-uptake	
Term for Impact	Facilitate
Short	<ul style="list-style-type: none"> Good cooking skills on how to prepare legumes Make legumes trendy / super / cool Associate beans to happiness (like beer or lemonade) Produce a product that contains legumes Tradition (emphasise them) and price (cheap) Introduce children to legumes asap in their life Market legumes as a separate stand-alone food group (as in Portugal) Establish a declaration of Meat-alternatives “Veggi-Burger” - to establish legumes as self-standing food (not an alternative)
Medium	<ul style="list-style-type: none"> Gardening programmes growing beans (legumes) Animal husbandry linked to biodiversity and legumes The government may pay more for meals in schools Regional cooperatives that help farmers to create competition Pro-legume business models Better products, non-GMO, local Develop regional cooperative legume processing units
Long	<ul style="list-style-type: none"> Long term contracts with fair conditions Quick EU policy improvement Image Facilitating farming and uptake Catering to school
Hinder	
Short	<ul style="list-style-type: none"> High prices of locally grown legumes Legumes introduced to diet too late in life Pseudoscience about legumes Misconceptions of older consumers, e.g. bean are “food for the poor” “Local” labelling lies (products packed locally but grown abroad)
Medium	<ul style="list-style-type: none"> Centralised/industrialised animal husbandry Cooking time (the value we put in it) Unfair price relation, e.g. soymilk has a higher (luxury) tax compared to regular milk Lack of attractiveness: good palatability; knowledge (nutrition quality, costs, cooking, recipes); incentives for the retail
Long	<ul style="list-style-type: none"> Meat industry <i>Status quo</i> / jobs that will be replaced

Towards the end of the breakout, there was general agreement that legumes were not being marketed effectively, and towards that end, we began scoping which slogans might be used to help the “cool appeal” of legumes.

Legume Slogans proposed:

- Cool Beans
- Bon Fajioli (good beans)
- Beans are saving the planet
- Do not worry, bean happy
- Beans are a revolution
- Beans: a logical choice
- Pro Green
- Go Green
- Beans make you smart (and fart)
- Beans up for something good?
- **Be Environmental Conscious Awesome Natural Sustainable (BEANS)**

While the need to improve the position of legumes as something fashionable was broadly accepted, concerns were raised regarding the fact that legumes and legume-based foods need to remerge as ‘common classic’ foods – which are also affordable and accessible commodities.

4.3 Points from breakout summary session

- The market for legumes and legume-based products is not firmly established; this needs to be prioritised.
- Development of marketing strategies using the “fail fast fail often” or “fail until you do not fail”, approaches.
- The desire for legumes and legume-based products can be achieved if we can find the correct words or logics.
- The consumer is key but the social value (first) then the price is critical – education regarding legumes may be a foundation to success but may not be essential.
- Development of a map app to connect consumers to local legume-focused outlets.
- Development of consumer (not production) focused policies.
- Development of legume-based merchandise (needs a marketing campaign from who/whom?).

Acknowledgements

We would like to thank **all participants** for their valuable contributions and insights in their experiences. We also thank **A38 Ship, Budapest Business School, Farm of Fodor Lajos and Kistücsök Restaurant** for hosting the conference.

Disclaimer

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Citation

Please cite this report as follows:

Balázs, B., Gyarmati, O., Kelemen, E., Maaß, H., Tran, F., Vasconcelos, M., Iannetta, P.P.M., (2018). Report of the Continental Legume Innovation and Network (LIN) Workshop, 11th – 13th September Budapest, Hungary. The LIN is developed by the H2020 project, ‘*Transition paths to sustainable legume-based systems in Europe*’ (TRUE), funded by the European Union’s Horizon 2020 Research and Innovation programme under Grant Agreement Number 727973.

DOI: 10.13140/RG.2.2.34675.27688

Annex I – C-LIN programme

LEGUME CONSUMERS

Looking at legumes through
the consumers' eye



2nd Continental Legume Innovation and Networking (LIN) Workshop
in Budapest, Hungary, Tuesday 11th September – Thursday 13th September

DAY 1 – Legume Fair – 11, September, 2018 – A38 Ship, River Danube, Budapest

13.00 Registration

14.00 Opening: James Hutton Institute + ESSRG/AK

- Welcome on board – Gábor Bertényi (AgriKulti)
- Foreword by Pete Iannetta (James Hutton Institute – TRUE project)
- Warm-up and outline of the conference – ESSRG, AgriKulti
- Short introduction to the Pecha Kucha presentation method

14.15 Pecha Kucha Night – Session 1 (8 presentations + 30 minutes Questions and Answers)

Master of Ceremony – Bálint Balázs (ESSRG)

- Short introductions and presentations from stakeholders from the whole legume supply chain.
- Special focus on human consumption and retail: *status quo* and outlook of food legume consumption, processing, products and product development, market challenges.

16.00 Coffee break

16.30 Pecha Kucha Night - Session 2 (8 presentations + 30 minutes Questions and Answers)

Master of Ceremony - Attila Králl (AgriKulti)

- Short introductions and presentations from stakeholders from the whole legume supply chain.
- Special focus on human consumption and retail: *status quo* and outlook of food legume consumption, processing, products and product development, market challenges.

18.15 Dinner and Networking Event

DAY 2 – Legume Innovation and Networking Workshop – 12, September, Budapest Business School – University of Applied Sciences

An all-day conference to showcase actually existing legume innovations

10.00 Welcome from the organisers – Bálint Balázs (ESSRG)

Background of the TRUE project – Pete Iannetta (TRUE coordinator, James Hutton Institute)

Legume consumption in Hungary – Anikó Juhász (Ministry of Agriculture) - TBC

10.20 Legumes and novel legume products – Marta Vasconcelos (UCP)

10.30 Nutritional Knowledge in Hungary – Antal Emese (TÉT Platform)

10.40 Market potential – opportunities for legumes in food service – Karen Hamann (IFAU)

10.50 Consumption policies for a legume-supported food system – Bálint Balázs (ESSRG)

11.00 Questions and Answers

11.20 Introduction to the case study poster session

11.25 Coffee Break

11.40 Building networks – Partner and Case Study Poster Session

Every legume initiative and every TRUE Case Study and / or partners who have a role in a Case Study is invited to present a poster

12.40 LUNCH

14.00 Stakeholder World Café

- What circumstances facilitate and hinder legume consumption?
- Which next steps are needed for a short, medium- and long-term solution?
- The results will be extracted by Market, Policy and Production theme leaders

15.30 Closing plenary

16.30 End of Day 2, Alternative programme: a special tour in the historical building of the university, and an exciting wine tasting with a sommelier and 14 different Hungarian wines.

DAY 3: The Role of Legumes in Premium Gastronomy - Field Trip, 13, September, Töreki, Balatonszemes, Lake Balaton

8.00 Travelling to Lake Balaton

10.30 Visiting the farm of Lajos Fodor and his famous beans in Törek

12.30 Lunch at Kistücsök Restaurant, Balatonszemes – presentations on the Hungarian Gastro Map and the top ingredients of 2018 in the Balaton Region

14.30 Tasting the waves of Lake Balaton

17.00 Travelling to Budapest, end of conference



Annex II - Participants

Stakeholder Groups

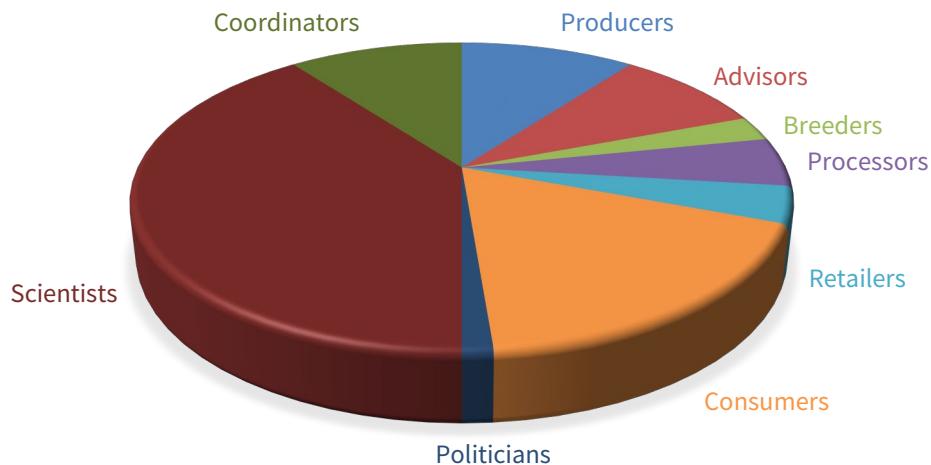


Table 1: Number of participants of each stakeholder group (multiple selection allowed)

Producer	Advisor	Breeder	Processor	Retailer	Consumer	Politician	Scientist	Coordinator
8	7	2	4	3	14	1	31	8

Legumes

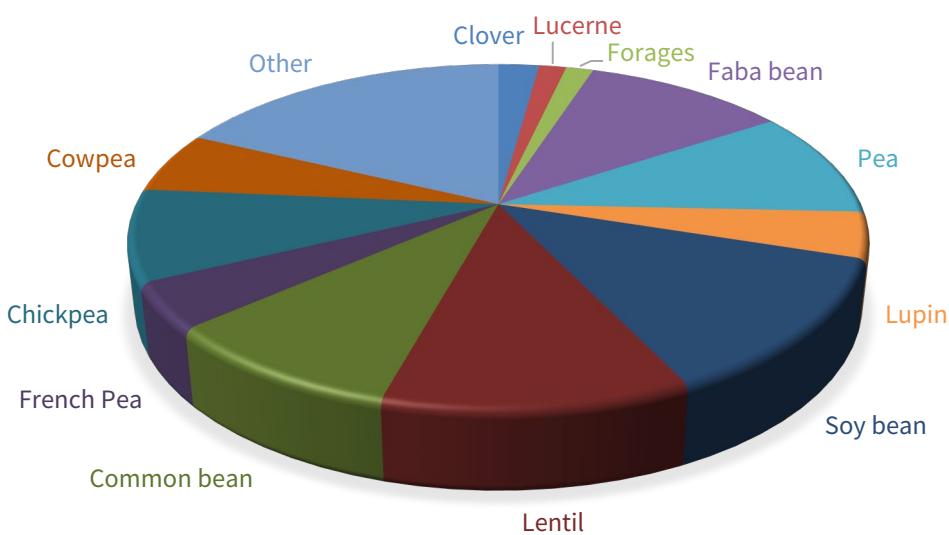


Table 2: Number of participants working with the different types of legumes (multiple selection allowed)

Clover	Lucerne	Forages	Faba bean	Pea	Lupin	Soy bean	Lentil	Common bean	French Pea	Chickpea	Cowpea	Other
3	2	2	15	14	6	18	16	13	6	12	8	25

List of Participants

Listed here are only those, who explicitly agreed to have their registration details published in this document.

András Bitsánszky

Research manager @ InDeRe

Fehérvári str. 132-144, 1116 Budapest, Hungary. Email: andras.bitsanszky@indere.hu

Legume(s): Faba bean, Pea, Lentil, Common bean

Stakeholder group(s): Scientist

Andrea Papp

Assistant research fellow @ Budapest Business School, Faculty of Commerce, Catering and Tourism
Alkotmány u. 9, 1054 Budapest, Hungary. Email: papp.andrea2@uni-bge.hu

Legume(s): Other

Stakeholder group(s): Scientist

Anita Varga

Dietitian @ National Institute of Pharmacy and Nutrition

Zrínyi u. 3., 1051 Budapest, Hungary. Email: varga.anita@ogyei.gov.hu

Legume(s): Pea, Soy bean, Lentil, Common bean, Chickpea

Stakeholder group(s): Scientist

Reason(s) for participation: The nutritional value of legumes is excellent. Therefore, nutrition professionals aim to increase legume consumption. This workshop provides an opportunity to broaden my knowledge and network with other experts.

Attila Králl

Scientific expert @ Agri Kulti Nonprofit Ltd.

Derék utca 7406, 2621 Verőce, Hungary. Email: krallattila@gmail.com

Legume(s): Faba bean, Lentil, Common bean, Cowpea, Other

Stakeholder group(s): Producer, Processor, Coordinator

Bálint Balázs

Managing director @ ESSRG Ltd

38 Romer Floris, 1024 Budapest, Hungary. Email: balazs.balint@essrg.hu

Legume(s): Other

Stakeholder group(s): Consumer, Scientist

Bertalan Kruppa

Soya Market Analyst @ Donau Soya Association

Wiesingerstrasse 6/9, 1010 Vienna, Austria. Email: kruppa@donausoja.org

Legume(s): Soy bean

Stakeholder group(s): Other



Claudia Nathansohn

Project coordinator @ Slow Food Deutschland e. V.

Luisenstraße 45, 10117 Berlin, Germany. Email: c.nathansohn@slowfood.de

Legume(s): Other

Stakeholder group(s): Other

Dénes Lóczy

Professor @ University of Pécs

Ifjúság útja 6., 7624 Pécs, Hungary. Email: loczyd@gamma.ttk.pte.hu

Legume(s): Pea

Stakeholder group(s): Scientist

Reason(s) for participation: I want to get information about the formation of the cluster of EU crop diversification projects.

Diana Szakal

Research associate/Community Coordinator @ ESSRG

2000 Szentendre, Hungary. Email: szakal.diana@essrg.hu

Legume(s): Other

Stakeholder group(s): Scientist, Coordinator

Eszter Kelemen

Senior researcher @ ESSRG

1024 Budapest, Hungary. Email: kelemen.eszter@essrg.hu

Legume(s): Other

Stakeholder group(s): Scientist

György Pataki

Senior Research Fellow @ ESSRG

1024 Budapest, Hungary. Email: pataki.gyorgy@essrg.hu

Legume(s): Other

Stakeholder group(s): Scientist

Henrik Maaß

Project manager @ Uni Hohenheim, GFE

Wollgrasweg 43, 70599 Stuttgart, Germany. Email: henrik.maass@uni-hohenheim.de

Legume(s): Clover, Faba bean, Lupin, Soy bean

Stakeholder group(s): Producer, Consumer, Scientist

Reason(s) for participation: 1.: As WP1 leader I coordinate the LIN Workshops. 2.: I like Budapest and want to see more about the legume stories there

Igor Lipovnik

Director of production @ Mill Žito, Žito d.o.o.

Meljska c.19, 2000 Maribor, Slovenia. Email: igor.lipovnik@zito.si

Legume(s): Pea

Stakeholder group(s): Producer

Reason(s) for participation: We are the biggest mill in Slovenia. We are interested in processing pulses.

Janka Horváth

Science shop coordinator @ ESSRG Ltd.

1118 Budapest, Hungary. Email: horvath.janka@essrg.hu

Legume(s): Other

Stakeholder group(s): Consumer

József Dezső

Assistant professor @ University of Pécs

Ifjuság 6, H-7624 Pécs, Hungary. Email: dejozsi@gamma.ttk.pte.hu

Legume(s): Other

Stakeholder group(s): Scientist

József Hegyesi

On-farm coordinator @ Növényi Diverzitás Központ (Center for Plant Diversity)

Külsőmező 15., 2766 Tápiószele, Hungary. Email: jhegyesi@mail.nodik.hu

Legume(s): Other

Stakeholder group(s): Coordinator

Reason(s) for participation: Being an on-farm coordinator, this event could be a good opportunity for networking and knowledge exchange.

Jurka Topol

Senior Expert Associate @ Public Institution for the Development of the Međimurje County REDEA

Bana Josipa Jelačića 22, 40000 Čakovec, Croatia. Email: jurka.topol@redea.hr

Legume(s): Other

Stakeholder group(s): Advisor, Consumer, Coordinator

Reason(s) for participation: I wish to participate as a TRUE project team member.

Karen Hamann

CEO, Head of Research @ IFAU Institute for Food Studies

2970 Hoersholm, Denmark. Email: karen@ifau.dk

Legume(s): Clover, Pea

Stakeholder group(s): Other

Reason(s) for participation: I want to know more about the market for legumes in East Europe particularly Hungary.



Katalin Rethy

Agroecologist, farmer @ Szezon Kert/ Freelance

Anna- laki 49, 2089 Telki, Hungary. Email: katalin.rethy@gmail.com

Legume(s): Faba bean, Pea, Common bean, French Pea, Chickpea, Cowpea

Stakeholder group(s): Producer, Consumer, Scientist

Magdalena Trstenjak

Treinee @ Public Institution for the Development of the Međimurje County

Bana Josipa Jelačića 22, 40 000 Čakovec, Croatia. Email: magdalena.trstenjak@redea.hr

Legume(s): Soy bean, Lentil

Stakeholder group(s): Producer, Consumer, Coordinator

Manuela Specht

Consultant @ UFOP e.V.

Claire-Waldhoff-Strasse 7, 10117 Berlin, Germany. Email: m.specht@ufop.de

Legume(s): Faba bean, Pea, Lupin, Soy bean

Stakeholder group(s): Other

Reason(s) for participation: UFOP (Union for the Promotion of Oil and Protein Plants) is the lobby association for protein plants in Germany!

Marcela Porto Costa

PhD researcher @ Bangor University

4 Saint James dr, LL57 2ED Bangor, United Kingdom. Email: marcela.costa@bangor.ac.uk

Legume(s): Forages, Faba bean, Pea, Lentil, Other

Stakeholder group(s): Scientist

Reason(s) for participation: Since our analysis evolves the whole legumes value chain, it is extremely important that we are connected to all stakeholders, so they can understand our work plan and contribute with valuable insights in order to benchmark legumes against traditional rotations.

Marietta Rezsek

Assistant professor @ University of Pécs

Ifjúság u 6, 7624 Pécs, Hungary. Email: rezsekmaja@gmail.com

Legume(s): Other

Stakeholder group(s): Scientist

Reason(s) for participation: I am PhD student at Univ of Pécs, my research area is the environmental problems and low input practices on sandy and loess-covered areas. My work belongs to the H2020 Diverfarming project in the Pannonian Pedoclimatic region.

Marta Vasconcelos

Principal Investigator @ Universidade Católica Portuguesa

Rua Arquitecto Lobão Vital 172, 4200-374 Porto, Portugal. Email: mvasconcelos@porto.ucp.pt

Legume(s): Faba bean, Pea, Soy bean, Lentil, Common bean, Cowpea

Stakeholder group(s): Consumer, Scientist

Mátyás Révai

Junior policy advisor @ Embassy of the Kingdom of the Netherlands

1027 Budapest, Hungary. Email: revai.matyas@minbuza.nl

Legume(s): Other

Stakeholder group(s): Advisor, Scientist

Metka Ačko

Food technologist @ Žito d.o.o.

2000 Maribor, Slovenia. Email: metka.acko@zito.si

Legume(s): Pea, Soy bean, Chickpea

Stakeholder group(s): Producer, Scientist

Reason(s) for participation: I and my colleagues participate in the Slovenian project about legumes and protein crops. So, this workshop is perfect for learning about legumes and meet new people from this profession.

Orsolya Gyarmati

Social media manager @ AgriKulti

2626 Nagymaros, Hungary. Email: gyarmatiorsi@gmail.com

Legume(s): Common bean

Stakeholder group(s): Processor, Consumer, Coordinator

Orsolya Papp

Deputy director @ ÖMKi

Miklós square 1., 1033 Budapest, Hungary. Email: orsolya.papp@biokutatas.hu

Legume(s): Pea, Common bean

Stakeholder group(s): Advisor, Scientist

Pietro P M Iannetta

Agroecologist @ James Hutton Institute

Invergowrie, DD25DA Dundee, United Kingdom. Email: pete.iannetta@hutton.ac.uk

Legume(s): Faba bean, Pea, Soy bean, Lentil, Common bean

Stakeholder group(s): Advisor, Breeder, Consumer, Scientist, Coordinator

Reason(s) for participation: I am coordinator of TRUE, and believe in the pivotal role of legumes as a foundation by which we may transform food- and feed-systems towards a more sustainable and harmonious state

Simon Vogt

Founder of „Hülsenreich“

Friesenstr. 15, 6112 Halle, Germany. Email: simon@huelsenreich.de

Legume(s): Pea, Lentil, Chickpea, Other

Stakeholder group(s): Retailer

Reason(s) for participation: The topic at hand is most fitting for a retailer of legume products, as the consumers' view on things is critical for businesses. I am thus looking forward to the different presentations on the topic. Furthermore, I am interested in the perspective and experience of other participants and looking for whatever opportunity for collaboration might arise.



Sophie Saget

PhD student @ Trinity College Dublin

EH165AA, Edinburgh, United Kingdom. Email: sagets@tcd.ie

Legume(s): Faba bean, Pea, Soy bean, Lentil, Common bean, French Pea, Chickpea, Cowpea

Stakeholder group(s): Consumer, Scientist

Tiziana Centofanti

Researcher and lecturer @ Central European University

1054, HUNGARY. EMAIL: Hungary. Email: centofantit@spp.ceu.edu

Legume(s): Soy bean

Stakeholder group(s): Scientist

Reason(s) for participation: networking, learning, communicating the results of my research

Uwe Lehrack

Head of Department @ Institute for Cereal Processing GmbH

Arthur-Scheunert-Allee 40, 14558 Nuthetal, OT Bergholz-Rehbrücke, Germany. Email: uwe.lehrack@igv-gmbh.de

Legume(s): Faba bean, Pea, Lentil

Stakeholder group(s): Producer, Processor, Scientist

Reason(s) for participation: I'm a member of the TRUE-Project....

Verónica Schmidt-Cotta

Agronomist at University of Hohenheim, Institute for crop production

Fruwirthstr. 23, 70599 Stuttgart, Germany. Email: ve.schmidtcotta@uni-hohenheim.de

Legume(s): Soy bean, Lentil

Stakeholder group(s): Scientist

Reason(s) for participation: I work with Sabine Gruber and Sabine Zikeli since June 2018 for the case studies in Hohenheim. I would like to get to know all members in TRUE and get more insight about their work.

Annex III - Presentation & poster pdfs

A copy of all the presentations and the posters have been uploaded to the TRUE website [here](#). In addition, a full video recording of the workshop can be accessed on YouTube [here](#).

Presentations:

Day 1 – Pecha Kucha presentations

- **Background to the TRUE project and TRUE case studies activities and innovation** - Pete Iannetta, TRUE-Coordinator, James Hutton Institute, United Kingdom
- **The value chain of legumes in Hungary and the place of legumes in small scale agroecological production - experience from Szezon Kert** – Katalin Réthy, Agroecologist / Vegetable Farmer (Szezon Kert), Hungary
- **Applied research along the whole value chain: an introduction of ÖMKI** - Orsolya Papp, Deputy Director, ÖMKI (Research Institute of Organic Agriculture), Hungary
- **The gene bank collections of legumes at the Center for Plant Diversity through the eyes of climate change** - Lajos Horváth, CPD, Tápiószele, Hungary
- **Legumes in school catering** - Dr. Bitsánszky András, Founder, InDeRe, Hungary
- **Grain legume research at NARIC Szeged** - Dr. Melinda Tar, Head of Department of Field Crops Research, National Agricultural Research and Innovation Center (NAIK), Hungary
- **Soybean production in Italy: why the largest producer in EU?** - Tiziana Centofanti, Researcher and Lecturer, Central European University, Hungary
- **Legume land races cultivated for premium gastronomy purposes** – Attila Králl, Research Expert, AgriKulti, Hungary
- **Vegetarian experiences and eating habits of self-defined ovo-lacto vegetarians, vegans, and omnivores** - Andrea Papp, Assistant Research Fellow, PhD student, University of Debrecen, Hungary?
- **Lentil farming: Farm structure and motivation of lentil farmers in SW Germany (CS 13)** - Verónica Schmidt-Cotta, University of Hohenheim, Germany
- **Make legumes great again - reviving a traditional food culture: Help us to create a cookbook based on European legumes (WP 1)** - Claudia Nathansohn, Slow Food, Germany
- **The 'Choose Beans' project (CS 19)** – Elisete Varandas, Eurest, Portugal
- **Environmental footprint of rotations with and without legumes (WP5)** - Marcela Porto-Costa, Bangor University, UK
- **Regional legume situation in a globalised market with other alternative trends for (protein) food supply (WP3)** - János Petrusán, IVG Institute for Cereal Processing GmbH, Nuthetal OT Bergholz-Rehbrücke, Germany
- **Experiences from the previous TRUE Mediterranean LIN-Workshop (WP1)** – Marta Vasconcelos, Catholic University of Portugal
- **My experiences from the TRUE project** – Karen Hamann, Institute for Food Studies (IFAU), Denmark

- **Experiences from the previous TRUE Continental LIN-Workshop (WP1)** – Henrik Maaß, Research Centre for Global Food Security and Ecosystems, University of Hohenheim, Germany
- **Was industrialisation of the food system responsible for the demise of legume cultivation in Europe?** - Pete Iannetta, TRUE Coordinator, The James Hutton Institute, United Kingdom

DAY 2 – Presentations at Budapest Business School

- **Background of the TRUE Project** - Pete Iannetta, TRUE-Coordinator, James Hutton Institute, United Kingdom
- **Legume consumption in Hungary** – Anikó Juhász, Ministry of Agriculture, Hungary
- **Legumes and novel legume products (WP3)** – Marta W. Vasconcelos, Catholic University of Portugal
- **Nutritional Knowledge in Hungary** – Emese Antal, TÉT Platform, Hungary
- **Market potential – opportunities for legumes in food service (WP4)** – Karen Hamann, Institute for Food Studies (IFAU), Denmark
- **Consumption policies for a legume supported food system in Europe (WP7)** – Bálint Balázs, senior research fellow and TRUE WP7 Leader, Environmental Social Science Research Group (ESSRG), Hungary and Eszter Kelemen, Assistant Professor, ESSRG

Posters:

- No. 1) Public food procurement in Hungary: A true window of opportunity for pulses? (WP7)
- No. 2) Grain legume research at NARIC, Szeged
- No. 3) Legumes in schools
- No. 4) Environmental investigations and researches for enhance the low-input management practices in Diverfarming project
- No. 5) Crop diversification and environmental problems in the Danube-Tisza interfluvies region
- No. 6) The study of genetic reserves of common bean landraces at the CPD, Hungary
- No. 7) Genetic reserves of cowpea – Hungarian sandy hills – climate change: the study of an alternative legume
- No. 8) Popular Science for Sustainable Nutrition
- No. 9) The value chain of legumes in Hungary – a qualitative analysis
- No. 10) The place of legumes in small scale agroecological production – experience from Szezon Kert
- No. 11) Soybean production in Italy
- No. 12) Making legumes a big player in the snack market
- No. 13) Development of protein-rich food based on extrusion (WP3)
- No. 14) An index combining environmental and nutritional aspects of foods (WP5)
- No. 15) Retailer-producer quality chains and innovations (CS9)
- No. 16) Legumes in public and private food service (CS11)
- No. 17) Situation of legumes in Croatia (CS16)
- No. 18) Stakeholder perspectives on transition paths to legume-supported agri-food systems (WP1)
- No. 19) FIT4FOOD2030 – Towards Food 2030: future-proofing the European food systems through Research & Innovation