



Legumes for a Sustainable World

ILS2 | Second International Legume Society Conference

11th - 14th OCT 2016
TRÓIA RESORT | PORTUGAL



Second International Legume Society Conference

Legumes for a sustainable world

Book of Abstracts



**11th – 14th October,
2016**

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Welcome Addresses

From the President of ILS (2011-2016)

The Legume Society was founded in 2011 after closure of former European Association for Grain Legume Research (AEP). Our mission was becoming the society of reference for ALL legumes **WORLDWIDE**, this is, extending the range of crops covered and the area of reference.

After five difficult years with absolutely lack of sponsors and any kind of financial support, we can proudly realize that Legume Society has consolidated with great success and has a promising future. This was possible only thanks to the voluntary work of a number of committed people.

We have been able to establish a solid and reliable series of triennial legume-devoted conferences as well as a dissemination magazine (Legume Perspectives), with a real niche serving as a dissemination tool for the legume community.

First Legume Society Conference was successfully organized at Novi Sad, Serbia in 2013. Second is taking place now (2016) at Troia, Portugal, together with a number of satellite events. Third is already planned at Poznan, Poland in 2019. We are sure that this reliable series of multidisciplinary conferences will be of great interest to legume experts, extending it to stake holders. We should acknowledge the great efforts made by the local organizers of these events.

At the General Assembly a new Scientific Committee will be elected that will for sure bring the renewed energies needed to continue with Legume Society endeavor. We all shall offer our support and gratitude and wish them success for future.

Diego Rubiales

From the Local Conveeners

We cordially welcome you to the Second International Legume Society Conference in the International Year of Pulses.

In a world urgently requiring a more sustainable agriculture, food security and healthier diets, the demand for legume crops is on the rise. This growth is fostered by the increasing need for plant protein and for more sustainable and environmentally friendly sound agricultural practices.

Food, feed, fiber and even fuel are all products that come from legumes – plants that grow with low nitrogen inputs and in harsh environmental conditions.

The second ILS Conference is welcoming more than 370 attendees from 53 countries, showing the international recognition of the work developed by ILS and the global importance of research in legumes.

The general aim of the conference is to update and discuss the knowledge developed in legume research, in its various facets, from their genomes sequencing, their genetic resources, their environmental response and adaptation, to their use in agricultural systems.

We wish you a fruitful and rewarding conference and a pleasant stay in wonderful peninsula of Tróia.

Pedro Fevereiro, Carlota Vaz Patto and Susana Araújo

Organizers

International Legume Society

The **International Legume Society** was founded in 2011 with two primary missions. One of them was to treasure the rich legume research tradition of the former European Association for Grain Legume Research (AEP), with emphasis on carrying out its the triennial legume-devoted conferences. Another one is to fulfill a long-term strategy of linking together the research on all legumes worldwide, from grain and forage legumes pharmaceutical and ornamental ones and from the Old World to the Americas.



ITQB NOVA

The **Instituto de Tecnologia Química e Biológica António Xavier (ITQB NOVA)** is a research and advanced training institute of **Universidade Nova de Lisboa**. The mission of **ITQB NOVA** is to carry out scientific research and postgraduate teaching in life sciences, chemistry and associated technologies, for the benefit of human health and the environment. ITQB's highly multidisciplinary nature makes it a leading centre for advanced training of researchers in Portugal.



Conveners

Pedro Fevereiro – ITQB NOVA

Carlota Vaz Patto – ITQB NOVA

Susana Araújo – ITQB NOVA

Diego Rubiales - Scientific Coordinator – IAS - CSIC



Scientific Committee

(in alphabetic order)

Michael Abberton - IITA, Nigeria

Shiv Kumar Agrawal - ICARDA, Syria

Paolo Annicchiarico - CREA-FLC, Italy

Stephen E. Beebe - CIAT, Colombia

Charles Brummer – Univ. California, USA

Adrian Charlton - FERA, UK

Gerard Duc - INRA, France

Noel Ellis – New Zealand

Pedro Fevereiro – ITQB NOVA, Portugal

Judith Lichtenzveig - Curtin Univ., Australia

Kevin McPhee - North Dakota State Univ., USA

Aleksandar Mikić - IFVC, Serbia

Eduardo Rosa - UTAD, Portugal

Diego Rubiales - CSIC, Spain

Fred Stoddard – Univ. Helsinki, Finland

Richard Thompson - INRA, France

Tom Warkentin – Univ. Saskatchewan, Canada

Local Organizer Committee

(in alphabetic order)

Nuno Almeida - ITQB NOVA

Ana Barradas – Fertiprado

Rita Caré – CiB

Manuela Costa – Univ. Minho

Isabel Duarte – INIAV

Sofia Duque – ITQB NOVA

Pedro Fevereiro – ITQB NOVA

Susana Leitão - ITQB NOVA

José Ricardo Parreira - ITQB-NOVA

Eduardo Rosa – UTAD

Marta Vasconcellos – ESB - UCP

Carlota Vaz Patto - ITQB NOVA

Manuela Veloso – INIAV

Sponsors

The organizers acknowledge the support of the following Sponsors:

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Science For A Better Life



Program



October 10th-11th 2016: Satellite events (registration needed)

10th-11th October **Ascochyta 2016 Workshop** - Room Arrábida IV

(program in <http://www.ascochyta2016.aweb.net.au/>)

11th October 09:00-18:00h **LEGATO project meeting**
(partners only) - Rooms Arrábida III & Douro

11th October 09:00-18:00h **EUROLEGUME project meeting**
(partners only) - Room Guadiana

11th October 09:00-18:00h **ABSTRESS project meeting**
(partners only) - Room Atlântico.

October 11th 2016: 18:00-20:00 ILS2 Conference Registration

October 12th 2016

08:00-12:00 Registration (cont.)

09:00-09:15 **Welcome address** - Room Arrábida I & II

09:15-10:30 Session 1, plenary: Legumes value chain: market requirements and economic impact - Room Arrábida I & II

Chaired by Eduardo Rosa (UTAD, Portugal) and Adrian Charlton (FERA, UK)

09:15-09:45 **Key lecture - Hakan Bahceci:** Forging a New Future for Pulses: Addressing research challenges with the momentum of the UN International Year of Pulses

09:45-10:00 P. Iannetta: Main-streaming pulses: exploring local solutions to supply chain limitations

10:00-10:15 F. Muel: Would the protein fraction be the future of oil and grain legume crops by 2030?

10:15-10:30 G. Dubois: Legume future from European Union perspective: Horizon 2020, EIP-AGRI and CAP

10:30-11:00 Coffee break

11:00-12:00 Session 2, plenary: Legumes and environment

- Room *Arrábida I & II*

Chaired by Richard Thompson (INRA, France) and Diego Rubiales (CSIC, Spain)

11:00-11:30 **Key lecture - Marie-Hélène Jeuffroy:** Validating the environmental benefits of legumes requires a territorial approach

11:30-11:45 B. Cupina: Environmental impact of introducing legumes into cropping system

11:45-12:00 C. Watson: Sustainable management of grass-white clover leys in ley-arable farming systems

12:00-13:00 Poster viewing

13:00-14:30 Lunch

14:30-16:00 Parallel sessions - Room *Arrábida III*

Session 3, parallel: Beneficial legume-microbe interactions

A

Chaired by Carmen Bianco (Univ. Bari, Italy) and Pedro Fevereiro (ITQB NOVA, Portugal)

14:30-15:00 **Key lecture - Jens Stougaard:** Receptor mediated signaling in legume symbiosis

15:00-15:10 J. Keller: Symbiotic genes expression in a context of nitrogen-fixing symbiotic specificity in *Lupinus*

15:10-15:20 M. Vosatka: Beneficial microbes associated with legumes

15:20-15:30 V. Bourion: Partner choice in a core collection of pea inoculated by a mix of five *Rhizobium* strains

15:30-15:40 M. Lepetit: Improving adaptation of legume-rhizobium symbiosis to the soil environment

15:40-16:00 General discussion on beneficial legume-microbe interactions

Session 4, parallel: Genetic resources - Room *Arrábida IV*

Chaired by Hari Upadhyaya (ICRISAT) and Rodomiro Ortiz (SLU, Sweden)

14:30-15:00 **Key lecture - Noel Ellis:** Where are we after 150 years of legume genetics?

15:00-15:10 E. von Wettberg: Using collections of wild relatives of chickpea to understand domestication

15:10-15:20 M. Carvalho: Characterizing the genetic diversity of cowpea accessions using a high-density SNP

15:20-15:30 K. Fischer: LupiBreed - Valorisation of novel genetic variability in narrow-leaved lupin

15:30-15:40 M. Nelson: Domestic bliss? Causes and consequences of a modern era domestication event

15:40-16:00 General discussion on genetic resources

16:00-16:30 Coffee break and Poster viewing

16:30-17:30 Parallel sessions

Session 5, parallel: Legumes value chain: market requirements and economic impact (cont.) - Room *Arrábida III*

Chaired by Frédéric Muel (Terres Inovia, France) and Pete Iannetta (JHI, UL)

16:30-16:40 L. Bedoussac: Evaluating cereal-legume intercrops towards sole crops

16:40-16:50 M. Magrini: Escaping from grain-legume socio-technical system lock-in

16:50-17:00 A. Bentaibi: Analysis of social and organizational aspects of food legumes chain

17:00-17:10 D. Lemken: The re-innovation of Mixed Cropping - who cares? - Trial willingness

17:10-17:30 General discussion on legumes value chain

Session 6, parallel: Root diseases - Room Arrábida IV

Chaired by Julie Pasche (North Dakota St. Univ., USA) and Nicolas Rispaill (CSIC, Spain)

16:30-16:40 L. Gentzbittel: Quantitative response of *M. truncatula* to verticillium wilt.

16:40-16:50 M.L. Pilet-Nayel: Genetics of pea resistance to *Aphanomyces euteiches* in the genomics Era

16:50-17:00 C. Coyne: Progress on understanding genetic resistance to *Fusarium* root rot in pea

17:00-17:10 S. Chatterton: Molecular quantification of pathogenic *Fusarium* spp. in soil to predict pea root rot risk

17:10-17:30 General discussion on root diseases

17:30-18:30 Poster session 1: Slots of flash presentations (3 min + 2 min questions) from selected posters (topics of the day) - Room Arrábida I & II

Chaired by Alessio Cimmino (Univ. Naples, Italy) and Georg Carlsson (SLU, Sweden)

A. Seabra Pinto: Do consumers' value the new use of legumes?

C. Ghoulam: Intercropping legume-cereals is a system to value legume-rhizobia symbiosis

J. Fustec: Synergy between crop diversity and earthworm community improve crop yields

C. Lotti: A novel source of genetic diversity in cultivated chickpea as revealed by GBS and genotyping

M.G. Tobar-Pinon: Genetic diversity of the Gautemalan climbing bean collection

M. Ruland: Temporal and regional development of lentil populations by natural selection on-farm

A. Moussart: Effect of pea sowing date on aphanomyces root rot development and yield losses

A. Lesné: Construction and evaluation of Near-Isogenic Lines for resistance to *Aphanomyces euteiches* in pea

R. Tollenaere: Nested Association Mapping for resistance to *Aphanomyces* in *M. truncatula*

C. Bianco: The auxin indole-3-acetic acid (IAA) is more than a plant hormone

20:45 Third International Legume Football Cup

October 13th 2016

8:30-10:00 Session 7, plenary: Legumes in food and feed and other alternative uses - Room Arrábida I & II

Chaired by Maria Carlota Vaz Patto (ITQB NOVA, Portugal) and Ambuj B. Jha (Univ. Saskatchewan, Canada)

08:30-09:00 **Key lecture - Frédéric Marsolais:** Using beans with novel protein compositions for nutritional improvement

09:00-09:15 M. Bronze: The hidden phenolic content of faba beans

09:15-09:30 J.C. Jimenez-Lopez: Use of narrow-leafed lupin b-conglutin proteins in human food to tackle diabetes

09:30-09:45 C. Domoney: Genetic diversity in pea and its impact on strategies for seed quality improvement

09:45-10:00 A.F. Monnet: Understanding the structuring of wheat-legume cakes to promote product innovation

10:00-10:30 Coffee break and Poster viewing

10:30-12:00 Session 8, plenary: Frontiers in legume genetics and genomics - Room Arrábida I & II

Chaired by Roberto Papa (Univ. Le Marche, Italy) and Marta Santalla (CSIC, Spain)

10:30-11:00 **Key lecture - Judith Burstin:** Towards the genome sequence of pea: a tribute to Mendel

11:00-11:15 P. Wan: Genome sequencing of *Vigna angularis* provides insight into high starch and low fat

11:15-11:30 P. Annicchiarico: Genotyping-by-sequencing and its exploitation in forage and grain legume breeding

11:30-11:45 S. Kaur: Application of historical data from Australian lentil breeding program in genomic selection

11:45-12:00 G. Boutet: WGGBS in pea without reference genome and data assembly

12:00-13:00 Poster session 2: Slots of 3 min flash presentations (+ 2 min questions) from selected posters (topics of the day) - - Room *Arrábida I & II*

Chaired by Nuno Almeida (ITQB NOVA, Portugal) and Sara Fondevilla (CSIC, Spain)

E. Collado: Pea straw: an advantageous co-product in dairy goat diets

C. Arribas-Martinez: Nutritional and nutraceutical characterization of extruded gluten-free snacks

M. Książkiewicz: Genes involved in flowering time regulation in white lupin

R.V. Penmetsa: Mendel's enduring legacy: orthologs of two of his seven factors in multiple current day crop legumes

R. Papa: **Bean Adapt**: The genomics of adaptation during crop expansion in common bean

A. Sarkar: The *Lathyrus sativus* genome project

H. Bobille: Effect of soil water deficit on amino acid exudation in *Pisum sativum* roots

C. Le May: Plant disease complex: antagonism and synergism between pathogens

A. Cimmino: Necrotrophic effectors produced by fungal pathogens of legume crops

A. Quillévéré-Hamard: Genetic and phenotypic diversity of pea isolates of *Aphanomyces euteiches* in France

L. Aguirrezabal: Modelling the effect of assimilates availability on seed weight and composition in soybean

13:00-14:30 Lunch

14:30-16:00 Parallel sessions

Session 9, parallel: Legumes in food and feed and other alternative uses (cont.) - Room *Arrábida III*

Chaired by Ruta Galoburda (Latvia Univ. of Agriculture, Latvia) and Tom Warkentin (Univ. Saskatchewan, Canada)

14:30-14:40 E. Tormo: A meta-analysis to assess the effect of fine grinding, dehulling and pelleting

14:40-14:50 E. Mecha: Protein quality of different Portuguese varieties of common bean

14:50-15:00 L. Proskina: Economic factors of using the legumes in broiler chickens feeding

15:00-15:10 M.C. Serrano: Tocopherols and carotenoids diversity in a chickpea germplasm

15:10-15:20 A. Clemente: Bowman-Birk inhibitors from legumes and mammalian gut health

15:20-15:30 A.B. Jha: Evaluation of a pea genome wide association study panel for folate profiles by UPLC-MS/MS

15:30-16:00 General discussion on legumes in food and feed and other uses

Session 10, parallel: Frontiers in legume genetics and genomics (cont.) - Room *Arrábida IV*

Chaired by Bernadette Julier (INRA, France) and Kevin McPhee (North Dakota State Univ. USA)

14:30-14:40 C. Le Signor: A protein quantity loci approach combined with a genome-wide association study

14:40-14:50 M.C. Vaz Patto: Using genomics to decipher the grain legumes quality riddle

14:50-15:00 A.M. Torres: Strategies and advances to identify candidate genes for low vicine-convicine in faba bean

15:00-15:10 M. Santalla: Homologues of Arabidopsis genes involved in photoperiod response in common bean

15:10-15:20 P. Smykal: Wild pea *P. fulvum* and *P. elatius* chromosome segment substitution lines in cultivated pea

15:20-15:30 A. Campa: Delimiting the physical positions of anthracnose resistance clusters

15:30-16:00 General discussion on frontiers in genetics and genomics

16:00-16:30 Coffee break and Poster viewing

16:30-17:45 Parallel sessions

Session 11, parallel: Frontiers in plant and crop physiology

- Room *Arrábida III*

Chaired by Christophe Salon (INRA, France) and Luis Aguirrezabal (CONICET, Argentina)

16:30-17:00 **Key lecture - Phil Mullineaux:** The identification of novel genes controlling plant - environment interactions

17:00-17:10 J. Vorster: Drought-induced transcriptome changes in soybean crown nodules

17:10-17:20 R. Metzner: In vivo monitoring of the development of legume roots, nodules and pods

17:20-17:30 G. Louarn: A common shoot developmental framework for perennial legume species

17:30-17:45 General discussion on frontiers in plant and crop physiology

Session 12, parallel: Integrated pest and disease management - Room *Arrábida IV*

Chaired by Jenny Davidson (PIRSA-SARDI, Australia) and Christophe Le May (INRA, France)

16:30-17:00 **Key lecture - Seid Kemal:** Integrated disease and insect pest management pest and in cool-season food legumes

17:00-17:10 A. Baranger: PISOM: Ideotypes, Systems, Surveys of pea and faba bean Main diseases

17:10-17:20 Y. Mehmood: The Australian *Ascochyta rabiei* population structure

17:20-17:30 W. Chen: Chickpea damping-off caused by metalaxyl resistant *Pythium* in the US Pacific Northwest

17:30-17:45 General discussion on integrated pest and disease management

17:55-19:00 ILS General Assembly - Room Arrábida I & II

20:45 Third International Legume Football Cup

October 14th 2016

8:30-10:00 Session 13, plenary: Frontiers in legume breeding - Room Arrábida I & II

Chaired by Wolfgang Link (Georg-August-University, Germany) and Gerard Duc (INRA, France)

08:30-09:00 **Key lecture - Scott Jackson:** Contribution of epigenetic variation to improvement

09:00-09:15 B. Julier: QTL detection for forage biomass of alfalfa in mixture with a forage grass

09:15-09:30 A. Charlton: Improving the resistance of legume crops to combined abiotic and biotic stress

09:30-09:45 M. Pazos: Integrated platform for rapid genetic gain in temperate grain legumes and wild *Cicer* species

09:45-10:00 A. Sarker: Broadening the genetic base of lentil

10:00-10:30 Coffee break and Poster viewing

10:30-12:00 Session 14, plenary: Frontiers in legume agronomy - Room Arrábida I & II

Chaired by Erik S. Jensen (SLU, Sweden) and Susana Araújo (ITQB NOVA, Portugal)

10:30-11:00 Key lecture - Eric Justes: Synthesis on the effects of grain legume insertion and cereal-grain legume intercrops in low input cropping systems in Southern France

11:00-11:15 E. Pelzer: Design and assessment of legume-based cropping systems with stakeholders in Europe

11:15-11:30 C. Porqueddu: Performance of legume-based annual forage crops in three Mediterranean regions

11:30-11:45 A. Lingner: Legume-based mixed cropping systems may have higher water use efficiency

11:45-12:00 G. Carlsson: Participatory development of grain legume-cereal intercrops for enhanced productivity

12:00-13:00 Poster session 3: Slots of 3 min flash presentations (+ 2 min questions) from selected posters (topics of the day) - - Room Arrábida I & II

Chaired by Sofia Duque (ITQB NOVA, Portugal) and Angel M. Villegas-Fernández (CSIC, Spain)

L. Wiesel: Starter fertilizers: Do they influence rhizobial populations in vining pea fields?

R. Bowness: Evaluation of agronomic practices on production of Clearfield red lentil in Alberta, Canada

R. Seljåsen: Nitrogen availability from peas and faba beans as pre-crops to broccoli followed by lettuce

J. Rebola Lichtenberg: Biomass production in mixed short-rotation woody cropping of *Populus* hybrids and *Robinia*

M. Cêran: Discovering genetic signatures of selection in the elite soybean germplasm

J. Aper: Flower abscission rates of early-maturing soybean varieties

C. Holdt: Genetic studies of winter hardiness in pea

A. Scegura: Marker-assisted backcross selection of virus resistance in pea

J.J. Ferreira: Genetic resistance to powdery mildew in common bean

M. Pérez-de-la-Vega: RNA-seq analysis of gene expression in lentils in response to *Ascochyta lentis* infection

V. Vernoud: A transcriptomic approach identifies candidate genes for drought tolerance in pea

13:00-14:30 Lunch

14:30-16:00 Parallel sessions

Session 15, parallel: Frontiers in legume breeding (cont.) -

Room *Arrábida III*

Chaired by Paolo Annicchiarico (CREA, Italy)

14:30-14:40 B. Taran: Genomic prediction for seed size in chickpea

14:40-14:50 L. Brünjes: Faba bean lines differ in their contribution as pollen donor to cross-fertilized seed

14:50-15:00 L. Pecetti: Assessing and overcoming genetic trade-offs in breeding grazing-tolerant alfalfa

15:00-15:10 T. Warkentin: Enhancing the nutritional quality of field pea

15:10-15:20 B. Rewald: Machine-learning approaches for root trait determination and differentiation of cultivars

15:20-15:30 R. Madhavan-Nair: An International network to improve mungbean breeding and production

15:30-16:00 General discussion on frontiers in legume breeding

Session 16, parallel: Advances in legume agronomy (cont.)

- Room *Arrábida IV*

Chaired by Fred Stoddard (Univ. Helsinki, Finland) and

Claudio Porqueddu (CNR, Italy)

14:30-14:40 G. Corre-Hellou: Ecosystem services provided by legumes and exploited by stakeholders

14:40-14:50 M. Guinet: Quantification of nitrogen fluxes and explanatory plant traits

14:50-15:00 N. Carton: Cereals as companion crops in cereal-grain legume intercrops: case of lupin

15:00-15:10 E. Journet: Intercropping lentil with spring wheat in organic farming

15:10-15:20 S. Guy: Diversification of USA dryland cropping systems using autumn-sown winter pea

15:20-15:30 J. Streit: Quantitative analysis of the root distribution in a faba bean-wheat intercropping system

15:30-16:00 General discussion on advances in legume agronomy

16:00-16:30 Coffee break and Poster viewing

Session 17, parallel: Legumes and environment (cont.) - Room *Arrábida III*

Chaired by Christine Watson (SRUC, UK)

16:30-16:40 E.S. Jensen: Soil nitrogen fertility and nitrogen acquisition in faba bean

16:40-16:50 D. Savvas: Impact of organic practices on growth, yield and greenhouse gas emissions

16:50-17:00 K. McPhee: Effect of simulated hail treatment on yield loss in chickpea

17:00-17:10 V. Verret: Meta-analysis of the effects of legume companion plants

17:10-17:20 S. Médiène: A tool integrating knowledge to select legume species for oilseed rape intercropping

17:20-17:30 V. Sánchez-Navarro: Nitrous oxide and methane fluxes from a cowpea-broccoli crop rotation

17:30-18:00 General discussion on Legumes and environment

Session 18, parallel: Resistance to biotic and abiotic stresses - Room *Arrábida IV*

Chaired by Weidong Chen (USDA-ARS, USA) and Laurent Gentzbittel (CNRS, France)

16:30-16:40 M. Dickinson: Exploring metabolic changes in legumes exposed to combined biotic and abiotic stress

16:40-16:50 K. Toyoda: The role of plant cell wall in resistance and susceptibility to pathogenic pathogen

16:50-17:00 J.M. Osorno: Detecting tolerant germplasm and QTLs associated with flooding stress in dry bean

17:00-17:10 S. Beji: Genome-Wide association mapping of frost tolerance in *Pisum sativum*

17:10-17:20 B. Ruge-Wehling: Marker-assisted breeding strategies for anthracnose resistance in lupin

17:20-17:30 D. Rubiales: Use of wild relatives in pea breeding for disease resistance

17:30-18:00 General discussion on resistance to biotic and abiotic stresses

18:00-19:00 Concluding session - Room *Arrábida I & II*

Poster and oral presentation awards

ILS Honorary member's awards

20:00 Farewell Dinner

October 15th 2016 (satellite events)

08:00-12:00 **REFORMA project meeting** (partners only) - Room *Douro*

08:00-12:00 **IYP_Research Strategy write shop** (by invitation) - Room *Atlântico*

P54 – S7

Intercropping sainfoin with annual crops for forage production and weed control

Milošević B., Karagić D., Mihailović V., Katanski S., Milić D., Vasiljević S., Živanov D.

Institute of Field and Vegetable Crops, Novi Sad, Serbia

Sainfoin in combination with forage pea, faba bean or oat, provides a superb feed for domestic animals such as cows, lactating ewes, goats, etc. As well, one of the benefits of this kind of variety mixture is reducing the weeds in forage.

The aim of this study was to examine the potential of intercropping sainfoin with annual crops (forage pea, faba bean and oat) for forage production. The trial with three replications was carried out at Experimental Field of Institute of Field and Vegetable Crops Novi Sad at Rimski Anevi. Sainfoin was the under sown crop, and forage pea, faba bean and oat were the companion crops. Control variant was pure stand of sainfoin. At the harvestable stage of sainfoin, forage yield (t ha^{-1}) and weed proportion (%), were monitored.

In all replications, sainfoin mixture with forage pea, faba bean and oat produced the highest green forage yield per hectare in comparison to control. The average green forage yield in mixture with oat (16.9 t ha^{-1}) was significantly higher than in forage pea (10.2 t ha^{-1}) and faba bean (11.4 t ha^{-1}) mixture. The significantly lowest weed proportion has been achieved in sowing with oat (1.5 %), while pure crop had the highest weed percentage (6.4 %, respectively).

Acknowledgement: This research was supported by The LEGATO Project "LEGumes for the Agriculture of TOMorrow", project number 613551, is funded by the European Union under the FP7 Programme.