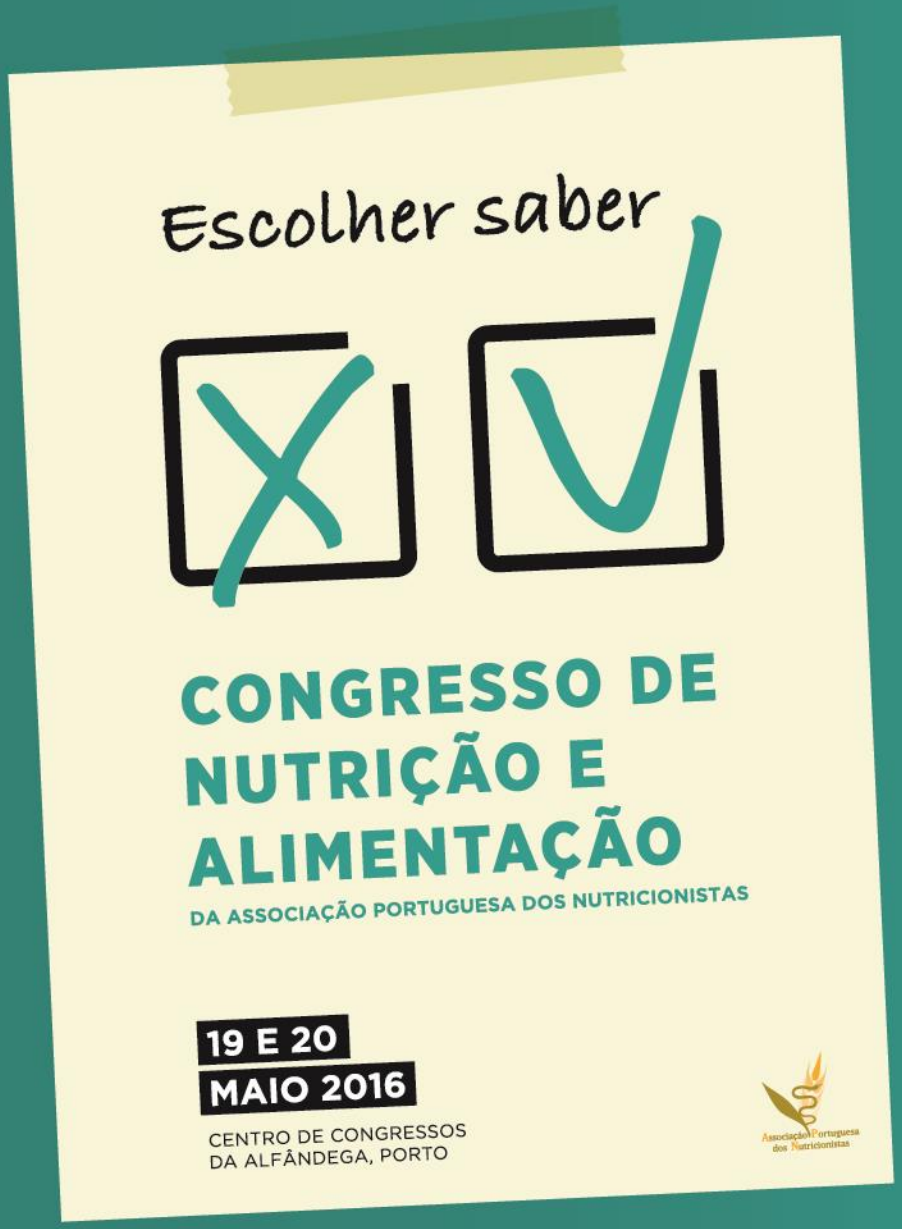
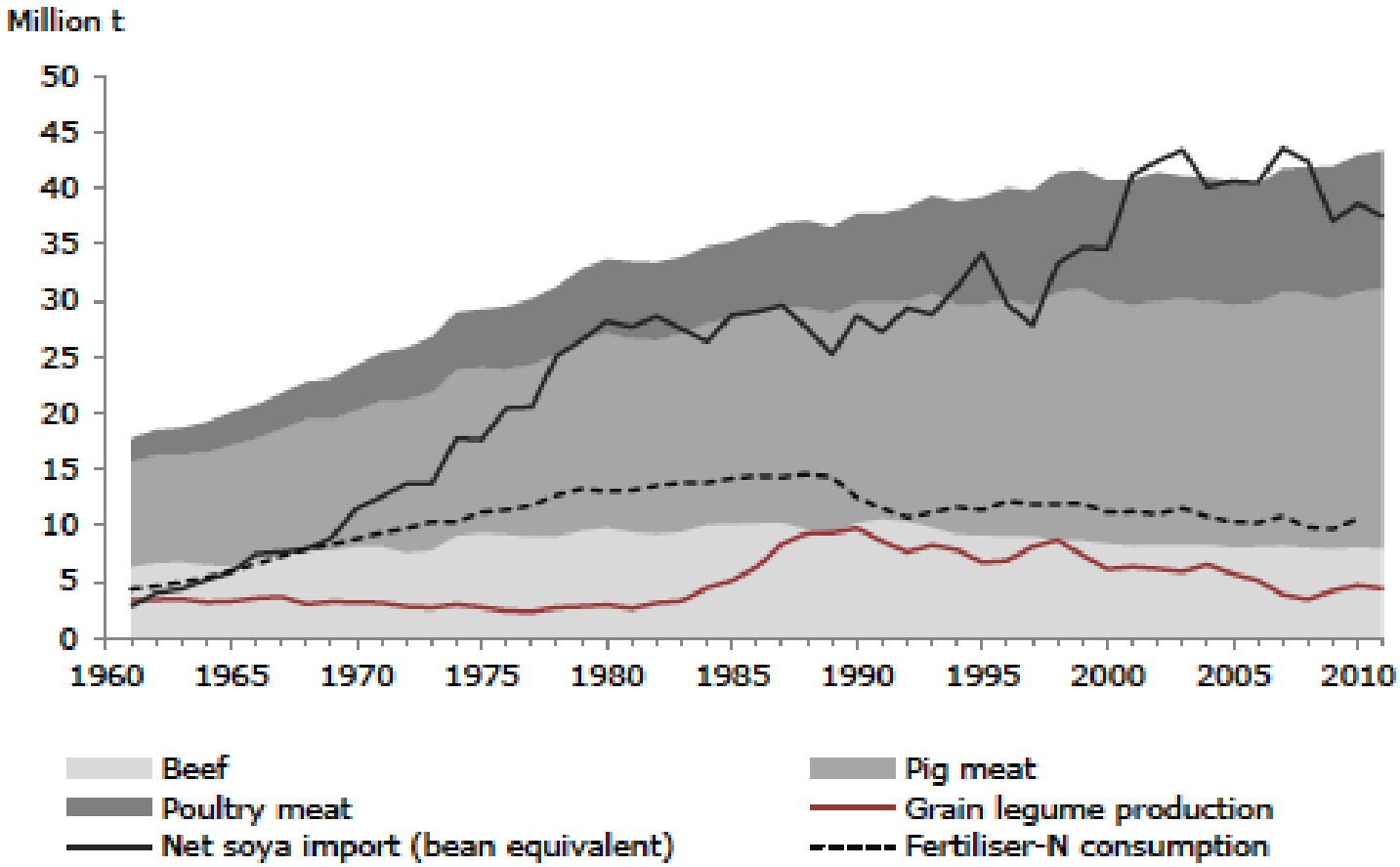


Novos projetos para melhorar a qualidade e aumentar o consumo das **leguminosas** na Europa

Marta W. Vasconcelos

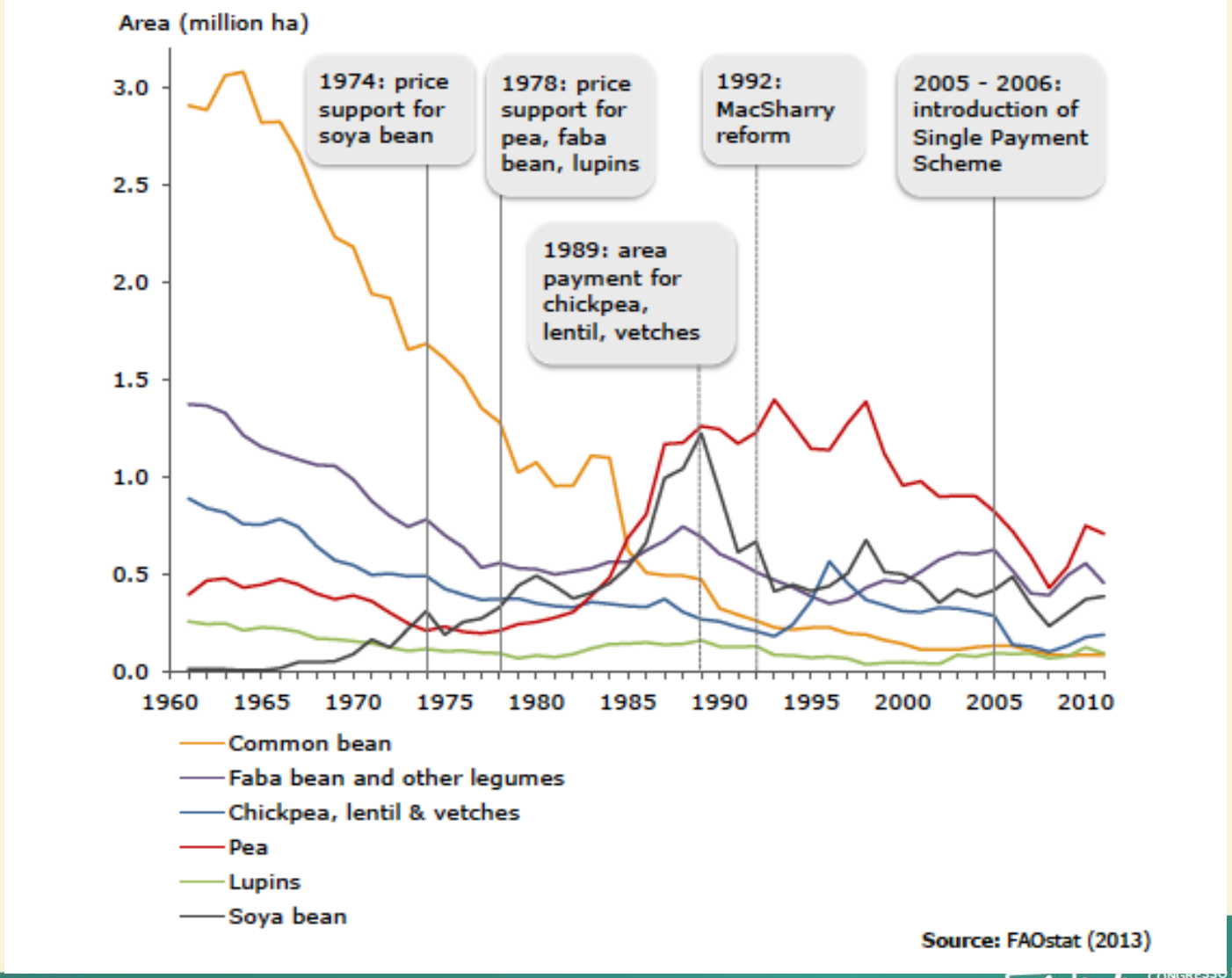
mvasconcelos@porto.ucp.pt

Produção de carne, leguminosas, importação de soja e fertilizantes de N na EU-27



Source: Calculations based on data from FAOstat (2013).

Áreas de produção de leguminosas EU-27



"TRUE"

- "**TR**ansition paths to s**U**stainable legume based systems in **E**urope"
- **H2020-SFS-2016-2017** (Sustainable Food Security)
- **Tipo de ação: RIA** (Research and Innovation action)
- **Coordenação**: James Hutton Institute (UK)
- 22 parceiros
- 10 propostas
- **5 propostas na 2ª fase**
- 5 M€

Dr. Pete Iannetta

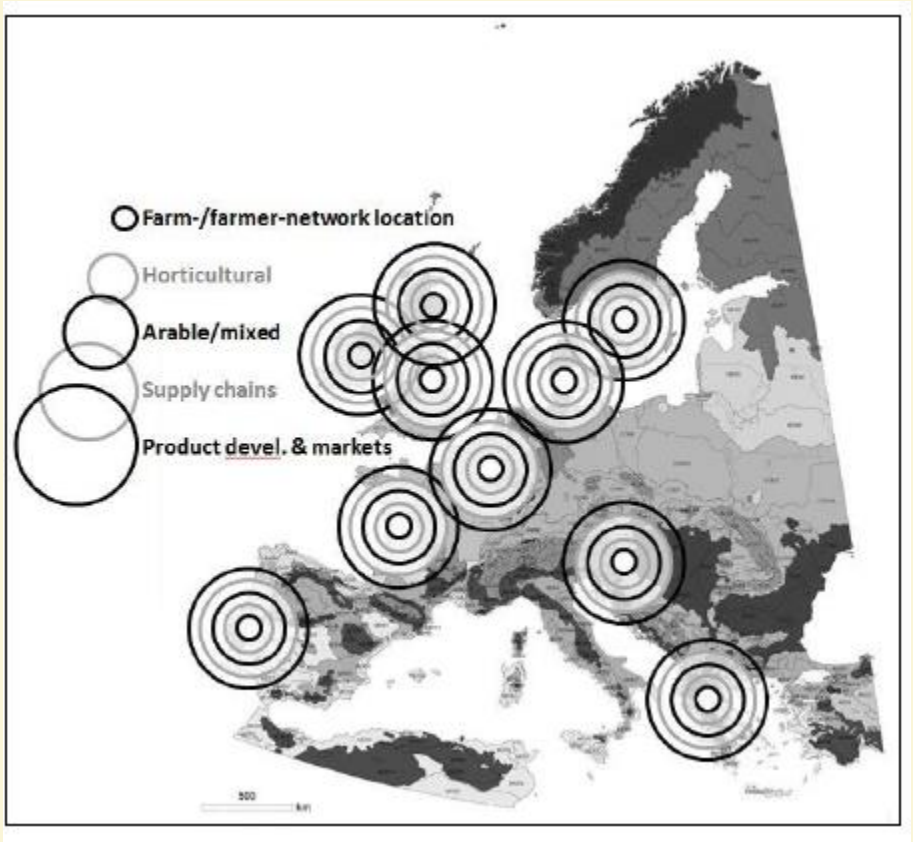
Alguns pensamentos "TRUE"

Como implementar uma transição de sucesso?

1) Aspetos sociais, económicos, ambientais
2) Mercados emergentes
3) Práticas locais
4) Aspirações socioeconómicas
5) Capacidades

Estudos de caso representativos, plataformas de inovação, disseminadas aos diferentes stakeholders (produtores, sociedade civil, investigação, academia, indústria…)

Os estudos de caso

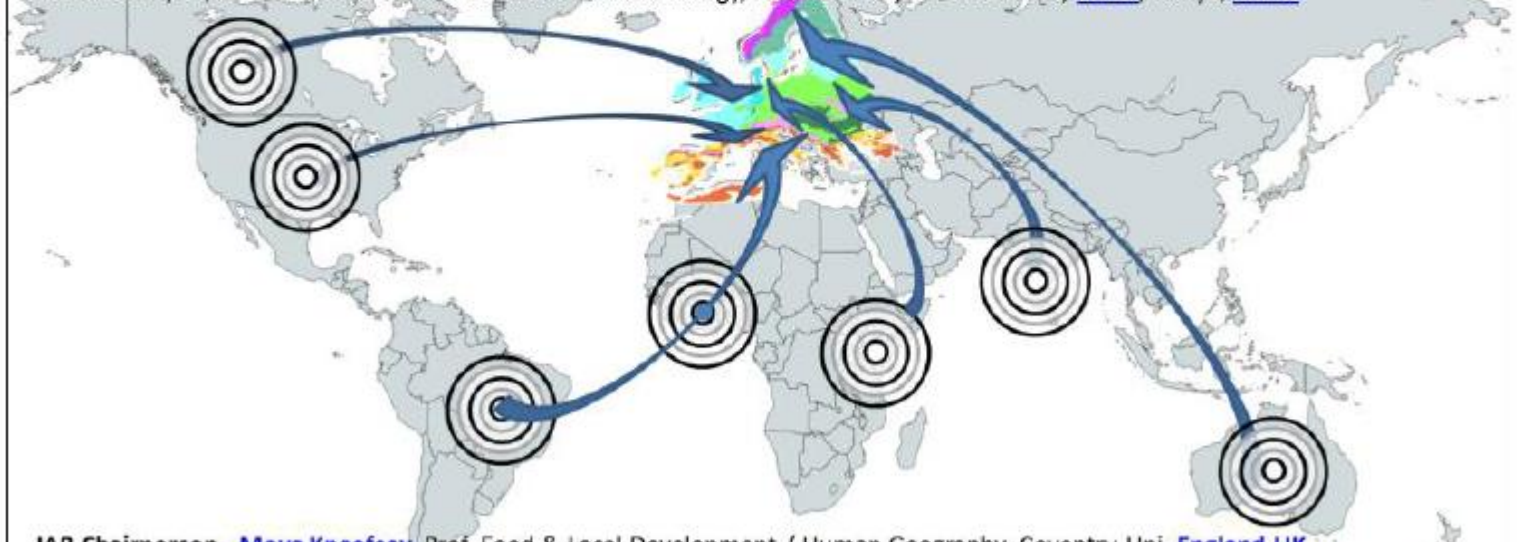


- 14 locais
- Convencional (7)
- Biológica (7)
- Grão de bico, feijão frade, fava, alfafa, lupinus, feijão, soja
- Vários sistemas de cultivo

Comité internacional

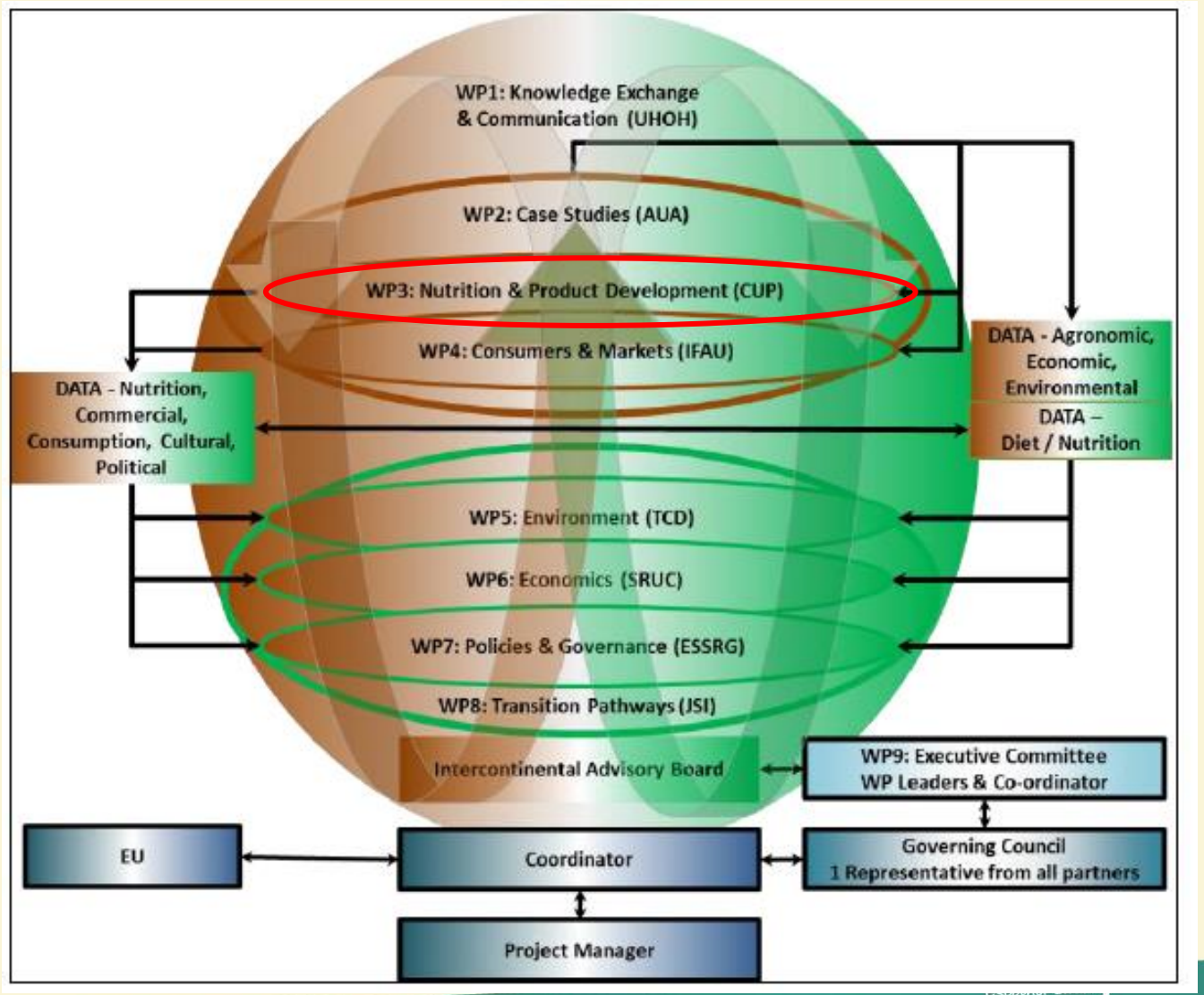
The Intercontinental Advisory Board

Robert Boddey, Prof., Soil Science & Biological Nitrogen Fixation, Embrapa Agrobiologia, Rio de Janeiro Area, Brazil.
- Also offers a case studies perspective on studies in Ghana
Laurence Carmichael, Dr, Coordinator WHO-Centre Healthy Urban Environments, Uni. West England, Bristol, England UK.
Michael A. Grusak, Prof., Pediatrics-Nutrition, Baylor College of Medicine, Houston, TX, USA.
Valentina Hažić, Head Rural Development, EIP Expert - Short Food Supply Chain Management, Čakovec, Croatia (EU rep.).
Trilochan Sastry, Prof., Decision Sciences &Information Systems, Indian Inst. Management, Bangalore, India.
Vandana Shiva, Dr, Executive Director of the Navdanya Trust, Hauz Khas, New Delhi, India.
Albert Vandenberg, Prof., & NSERC Industrial Research Chair, Uni. Saskatchewan, Canada.
David Odee, Dr, Chief Research Officer & Head of Biotechnology, Ass. Ed. *Ecosystems Services*, KEFRI, Kenya, Africa.



IAB Chairperson - Moya Kneafsey, Prof. Food & Local Development / Human Geography, Coventry Uni, England UK
IAB Vice-chair - Bob Rees, Prof. Agriculture & Climate Change, Head SRUC's Carbon Management Cent., Scotland UK
- Co-ordinator EU-FP7 project Legume Futures (www.legumefutures.eu)

Estrutura


WP1: Knowledge Exchange & Communication (UHOH)
WP2: Case Studies (AUA)
WP3: Nutrition & Product Development (CUP)
WP4: Consumers & Markets (IFAU)
DATA - Nutrition, Commercial, Consumption, Cultural, Political
DATA - Agronomic, Economic, Environmental
DATA – Diet / Nutrition
WP5: Environment (TCD)
WP6: Economics (SRUC)
WP7: Policies & Governance (ESSRG)
WP8: Transition Pathways (JSI)
Intercontinental Advisory Board
WP9: Executive Committee WP Leaders & Co-ordinator
EU
Coordinator
Governing Council 1 Representative from all partners
Project Manager

WP3 Nutrição e desenvolvimento de produtos

1. Desenvolver novas aplicações para as leguminosas para alimentação humana e ração animal, aumentando valor acrescentado
2. Melhorar tecnologias para processamento e utilização das leguminosas
3. Aumentar a produção e utiliação das leguminosas, incluindo aspetos de marketing e distribuição

Impacto

- ✓ Novos sistemas de produção;
- ✓ Novas cadeias agro-alimentares sustentáveis baseadas nas leguminosas;
- ✓ Impactos ambiental reduzidos (poluição de água, gases de estufa);
- ✓ Novas bases científicas para suportar medidas políticas (CAP, Water Framework Directive, etc);
- ✓ Consumo de leguminosas aumentado

Mas e o alto CO_2?

doi:10.1038/nature13179

Increasing CO_2 threatens human nutrition

Samuel S. Myers[1,2], Antonella Zanobetti[1], Itai Kloog[3], Peter Huybers[4], Andrew D. B. Leakey[5], Arnold J. Bloom[6], Eli Carlisle[6], Lee H. Dietterich[7], Glenn Fitzgerald[8], Toshihiro Hasegawa[9], N. Michele Holbrook[10], Randall L. Nelson[11], Michael J. Ottman[12], Victor Raboy[13], Hidemitsu Sakai[9], Karla A. Sartor[14], Joel Schwartz[1], Saman Seneweera[15], Michael Tausz[16] & Yasuhiro Usui[9]

Dietary deficiencies of zinc and iron are a substantial global public health problem. An estimated two billion people suffer these deficiencies[1], causing a loss of 63 million life-years annually[2,3]. Most of these people depend on C_3 grains and legumes as their primary dietary source of zinc and iron. Here we report that C_3 grains and legumes have lower concentrations of zinc and iron when grown under field conditions at the elevated atmospheric CO_2 concentration predicted for the middle of this century. C_3 crops other than legumes also have lower concentrations of protein, whereas C_4 crops seem to be less affected. Differences between cultivars of a single crop suggest that breeding for decreased sensitivity to atmospheric CO_2 concentration could partly address these new challenges to global health.

experiments contribute more than tenfold more data regarding both the zinc and iron content of the edible portions of crops grown under FACE conditions than is currently available in the literature. Consistent with earlier meta-analyses of other aspects of plant function under FACE conditions[14,15], we considered the response comparisons observed from different species, cultivars and stress treatments and from different years to be independent. The natural logarithm of the mean response ratio (r = response in elevated $[CO_2]$/response in ambient $[CO_2]$) was used as the metric for all analyses. Meta-analysis was used to estimate the overall effect of elevated $[CO_2]$ on the concentration of each nutrient in a particular crop and to determine the significance of this effect (see Methods).

We found that elevated $[CO_2]$ was associated with significant decreases in the concentrations of zinc and iron in all C_3 grasses and le-

Leguminosas vão ter menos Fe, Zn e proteína

Desafio global:

Manter um elevado teor nutricional

Fe, Zn

Porque são importantes?

deficiência Fe Zn

2 mil milhões

63 milhões

Legumi-nosas

Problema grave de saúde pública

Com deficiência

Perdas de vidas

Ricas em **Fe e Zn**

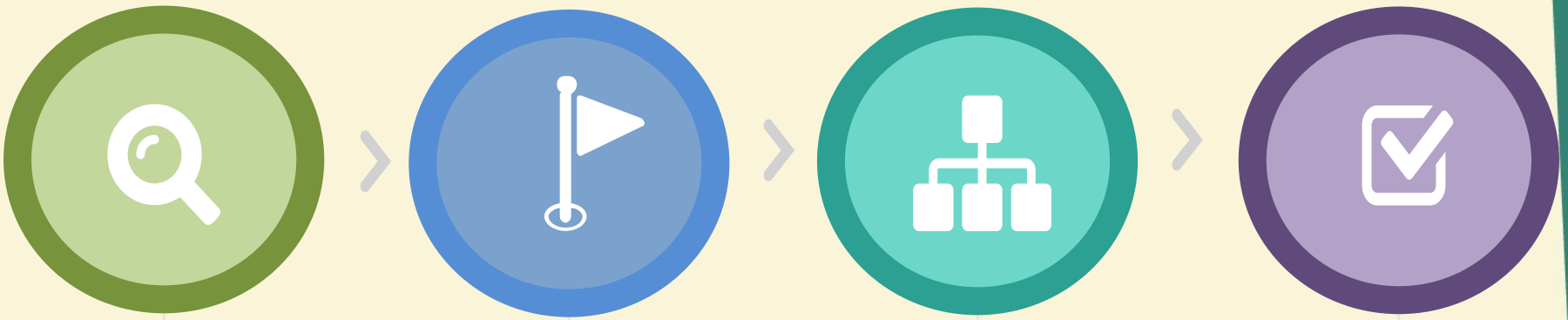
Ricas em **proteína**

Novo projeto

- **NUTRI4CAST:** "Previsão Nutricional: mitigar o impacto das alterações climáticas na nutrição das leguminosas"
- **Duração**: 1 Maio 2016 - 30 Abril 2019
- **Financiamento**: FCT (199.496,00€)
- **Leguminosas**: Soja e feijão

Como abordar este problema?

Os passos necessários



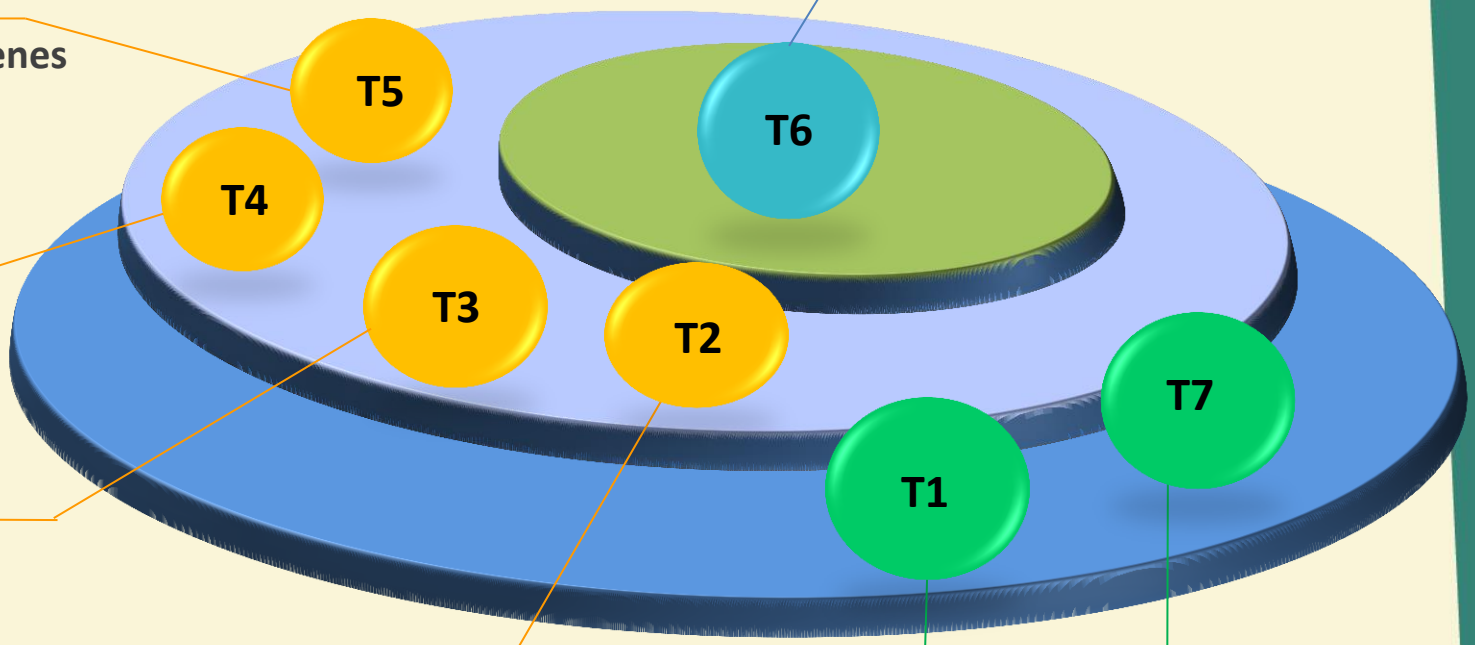
Identificar cultivares que resistem ao alto CO_2

Identificar as características chave

Desenvolver estratégias direccionadas

Leguminosas nutritivas para o futuro

NUTRI4CAST



AMBIENTE/ALTO CO_2, +Fe/-Fe

NUTRI4CAST

Free Air CO_2 enrichment (FACE)

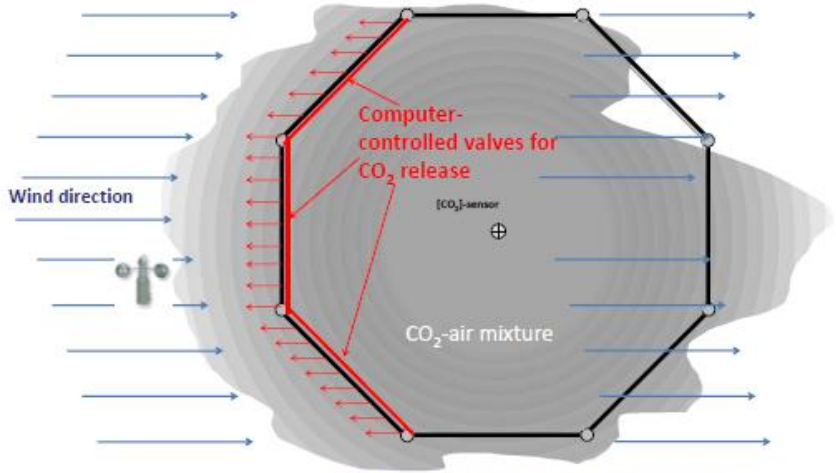


Fig. 1: Principle of FACE technology. Valves open in down-wind direction resulting in a controlled increaase of CO_2 in air mixturre. CO_2 is released with high pressure against wind direction ensuring good gas mixture

FACE technology allows the controlled enrichment of atmospheric CO_2 to 550 ppm under natural conditions

Breed-FACE to provide experimental infra-structure to develop crops for the future

Fig. 2: Existing FACE ring at Florenzuola d'Arda, Italy. The new Breed-FACE infrastucture is based on experience of this experimental site (CNR Italy)

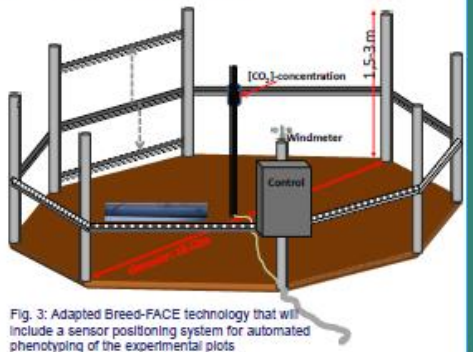


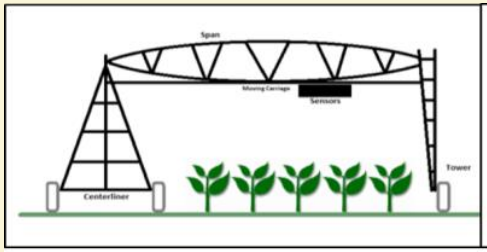
Fig. 3: Adapted Breed-FACE technology that will include a sensor positioning system for automated phenotyping of the experimental plots

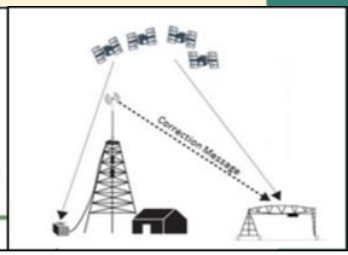
Existing FACE technology was adapted for the needs of breeders and is currently being assembled at the Forschungszentrum Jülich. Three rings each spanning a diameter of 20 meters will be installed by 2015

Metas

Crescimento das leguminosas

Análise nutricional e metabólica





Análise transcritómica

Breed-FACE

Análise morfológica e fisiológica

Avaliação em alto CO_2

Modelo preditivo

Ano 1 **Ano 2** **Ano 3**

NUTRI4CAST

Impacto

- Segurança alimentar
- Alterações climáticas
- Nutrição
- Agricultura
- Biotecnologia

Agradecimentos

- Equipa PlanTech
- FCT: PTDC/AGRPRO/3972/2014
- ESB-UCP: UID/Multi/50016/2013
- Onno Muller (Julich, Alemanha)

Perguntas?