

Progress report 2007

Meta-analyses and their application in agriculture: a case study on variety mixtures of cereals

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Timescale: March 2006 – May 2009
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Background

Mixed cultivation of several varieties of a crop is a promising contribution to a more sustainable agricultural production. Through variety mixing, various types of diversity are introduced to the crop stand that may provide increased and enhanced yields in low-input systems and reduce the need for herbicide and fungicide application. A large number of experimental results on the agricultural and industrial performance of variety mixtures are accumulating. However, it is practically impossible to control all environmental parameters in the single experiments and information on general relationships and factors of importance for the successful application of variety mixtures may be overlooked.

Objectives

The primary objective of this project is to obtain such information through meta-analysis, a statistical technique that enables evaluation of research results across different studies and thus provides an exciting possibility to infer general tendencies from variety mixture data. The project in this way aims at increasing the applied value of variety mixtures and setting up targets for future research on variety mixtures. To achieve this, the project will also consider the specific possibilities and challenges of applying meta-analysis on agronomic data such as those deriving from variety mixtures.

Progress for the period October 2006 – October 2007

Research activities

- Decisions on relevant data and options
- Planning and construction of a database for managing the large body of experimental data
- Programming in *R* to call data from the database
- Collection of published literature to be used in meta-analyses
- Extraction of data from collected studies to the database
- Adaptation of existing meta-analysis methodology to use on variety mixture data
- Pilot study: Meta-regression of data from the Danish BAR-OF trials
- Discussions on philosophical problems related to meta-analysis of variety mixture data
- Discussed subjects for peer-reviewed papers

Stays abroad

- Short-term scientific mission with Adrian Newton at SCRI, Dundee, UK (5 days): collecting results and background data from 15 years of partly unpublished field trials on variety mixtures

- Short-term scientific mission with Maria Finckh, University of Kassel, Witzenhausen, Germany (5 days): collecting results and background data from 20 years of partly unpublished field trials on variety mixtures

PhD courses

- Course on *Statistical models with random effects*, Department of Natural Sciences, KVL [6 ECTS]
- Course on *R for biostatisticians*, Faculty of Health Sciences, University of Copenhagen [2.5 ECTS]
- SOAR summer school 2007 on *Scales and cross-scales in ecosystem services in agriculture and organic farming* [4 ECTS]
- SOAR semester seminars – ad-hoc status [2 ECTS]
- On-going ad-hoc course in statistical techniques related to meta-analysis [12 ECTS]

Conferences etc.

- None

SOAR activities

- RVP meetings as deputy Ph.D. member
- Participation in SOAR course on Supervision
- Co-planning and participation in SOAR seminar on Research and Publication Bias

Leave or part time periods

- Two weeks paternity leave in January/February 2007

Other activities

- None

Plans for the period October 2007 – October 2008

Research activities

- Finish extraction of data to the database
- Perform meta-analyses on extracted data
- Write drafts for peer-review publications

Stays abroad

- None planned

PhD courses

- Finish on-going ad-hoc course
- SOAR summer school 2008 on Research Methodologies in relation to Principles of Organic Farming and Food Production

Conferences etc.

- None planned

SOAR activities

- SOAR summer school in 2008 [4 ECTS]
- SOAR seminars in 2008

Leave or part time periods

- 10 weeks paternity leave in October-December 2007

Other activities

- None planned

Presentations

- Poster on meta-regression of the Danish BAR-OF data presented at the SUSVAR Workshop: Varietal characteristics of cereals in different growing systems with special emphasis on below ground traits. Velence, Hungary, 29 May – 01 June 2007
- Oral presentation at forum for Plant Pathology at SCRI, Dundee, UK
- Oral presentation at Organic Agricultural Sciences Forum at University of Kassel, Germany

Publications

- Kiær, Lars; Skovgaard, Ib and Østergård, Hanne (2007) Yield of spring barley mixtures as a function of varietal and environmental characteristics. Paper presented at the COST SUSVAR Workshop: Varietal characteristics of cereals in different growing systems with special emphasis on below-ground traits, Velence, Hungary, 29-31 May, 2007. Published on OrgPrint: <http://orgprints.org/11371/>
- Kiær, Lars; Skovgaard, Ib and Østergård, Hanne (2006) Meta-analysis is a powerful tool to summarize variety mixture effects - exemplified by grain yield and weed suppression of spring barley. In: Østergård H. and L. Fontaine (Eds.). Proceedings of the COST SUSVAR workshop on Cereal crop diversity: Implications for production and products. 13-14 June 2006. La Besse, France. Published on OrgPrint: <http://orgprints.org/9380/>

Time schedule details (whole PhD period)

Total period(s) of leave (not working on PhD project)

- 24/01/07 – 06/02/07
- 01/10/07 – 31/12/07

Total period of extra employment on PhD project

- None

(Planned) date of submission of thesis

- 23/5/09

(Planned) date for defence

- None