

Progress report 2006

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

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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 possibilities and challenges of applying meta-analysis on agronomic data such as those deriving from variety mixtures.

Progress (– October 1, 2006)

The most important achievements of the first half year of the Ph.D. project include:

- Establishment and completion of regular meetings with one or both supervisors
- Specification of organisms and types of results to be targeted
- Literature studies on meta-analysis methodology, critique and applications
- Collection of published literature to be used in meta-analyses
- Participation in SOAR seminar on writing press releases
- Meta-analysis of variety mixture data from the Danish BAR-OF trials
- Participation at student's projects-day at Risø National Laboratory
- Participation and presentations at workshop in France (see Presentations section below)
- Participation and presentation at workshop in Poland (see Presentations section below)
- Visiting Anna Tratwal, Plant Protection Institute, Poznan, Poland: collection and translation of variety mixture studies published locally (in Polish)
- Planning of short-term visits to research groups engaged in the field of variety mixtures
- Presently participating in course on statistical models with random effects

Plans (October 1, 2006 – October 1, 2007)

- Short-term visits to research groups in Dundee, UK, and Witzenhausen, Germany
- Begin extraction of data from collected studies
- Adapt and develop existing meta-analysis methodology to use on variety mixture data
- Begin meta-analyses
- Considerations on philosophical problems related to meta-analysis of variety mixture data
- All courses planned and/or finished (incl. two SOAR summer schools in 2007 and 2008)
- Decide on subjects for peer-review publication

Presentations

- Oral and poster presentations on the subject of meta-analysis and its application on variety mixture data (SUSVAR Workshop on cereal crop diversity: Implications for production and products. La Besse, South West France, June 12-14, 2006)
- Oral presentation of meta-analysis methodology (Workshop: analyses of comparisons between organic/low input and conventional variety trials. Slupia Wielka, Poland, September 3-5, 2006)
- Talks about the possibilities of meta-analysis of biological data (Student's projects-day at Risø National Laboratory, April 27, 2006)

Publications

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](#). Paper presented at Proceedings of the COST SUSVAR workshop on Cereal crop diversity: Implications for production and products, La Besse, France, 13-14 June 2006, page pp. 49-52. ITAB, Paris, France.