

STATISTICAL TOOLS FOR PLANT PHENOMIC DATA ANALYSIS
Zaragoza (Spain), 20-24 January 2020

PROGRAMME

- 1. Prediction, Prescription, Precision and Plant Phenotyping (1 hour) (J. Betrán)**
- 2. Introduction to phenomics (2 hours L) (A. Hund, L. Roth)**
 - 2.1. The European Plant Phenotyping Network and EMPHASIS
 - 2.2. Field phenomics including sensors and carriers
 - 2.3. Indoor platforms
 - 2.4. Data processing pipeline for crop phenomics
- 3. Choosing the design for field and platform experiments (3 hours L + 1 hour P) (H.P. Piepho, J. Hartung, E. Millet)**
 - 3.1. Fully replicated experiments (3.1 to 3.3: 3 h)
 - 3.2. Partially replicated experiments
 - 3.3. Design of multi-environment trials
 - 3.4. Practical work (1 h)
- 4. Data collection and handling (1 hour L + 2 hours P) (A. Hund, L. Roth)**
 - 4.1. Introduction to feature extraction (1 h)
 - 4.2. Case study and practical work on date-time formats and relational data tables (2 h)
- 5. Mixed models analysis of extracted features (4 hours L + 4 hours P)**
 - 5.1. Single experiment (5.1 to 5.3: 4 h) (H.P. Piepho, J. Hartung)
 - 5.2. Multiple experiment (H.P. Piepho, J. Hartung)
 - 5.3. Analysis of time series (H.P. Piepho, J. Hartung)
 - 5.4. Case studies and practical work (4 h) (H.P. Piepho, J. Hartung, F. van Eeuwijk, E. Millet, D. Bustos)
 - 5.4.1. Correcting for spatial variation and temporal modelling
 - 5.4.2. Rerandomization in platforms
- 6. Statistical and machine learning techniques for feature extraction (4 hours L + 2 hours P)**
 - 6.1. Dimension reduction and cluster analysis (6.1 to 6.3: 4 h) (F. van Eeuwijk, S. Chapman, E. Millet, D. Bustos)
 - 6.2. Penalized regression, classification and regression trees (F. van Eeuwijk, S. Chapman, E. Millet, D. Bustos)
 - 6.3. Deep learning (F. van Eeuwijk, S. Chapman, E. Millet, D. Bustos)
 - 6.4. Case study and practical work on feature extraction from hyperspectral canopy reflectance data using indices and multivariate analyses (2 h) (A. Hund, J. Andereg, F. van Eeuwijk, E. Millet, D. Bustos, S. Chapman)
- 7. Environmental data for modelling phenomic data (2 hour L + 2 hours P)**
 - 7.1. Recording of environmental variates for plant phenotyping experiments (1 h) (A. Hund)
 - 7.2. Construction of environmental indexes (1 h) (E. Millet, S. Chapman)
 - 7.3. Case study and practical work on modelling growth and developmental processes using environmental covariates (2 h) (A. Hund, L. Kronenberg, F. van Eeuwijk, E. Millet, D. Bustos, S. Chapman)
- 8. Integration of environmental, genomic and phenomic data (3 hours L + 3 hours P) (F. van Eeuwijk, E. Millet, D. Bustos, S. Chapman)**
 - 8.1. QTL and association mapping (8.1 to 8.3) (3 h)
 - 8.2. Genomic prediction
 - 8.3. Use of crop growth modelling
 - 8.4. Practical work (3 h)