

# NOTES FROM DISCUSSION GROUPS

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## I.A. spatial modelling

### I.A.1. *research questions*

#### CROPPING SYSTEM ORGANISATION

##### management

- how to organise cropping systems in regions and landscape to limit invasive weeds
- how to organise cropping systems in regions and landscape to propose enough food for birds

##### understanding-research

- progress of weeds from grass strips into fields
- semi-natural areas, how weeds spread and reproduce outside fields
- obstacles, hedges, grass strips, corridors
- weed dispersal through trucks, tools etc, along roads and between fields

#### REGION OR CONTINENT

- continent and regional level: which factors limit or favour invasive weeds

#### INTRAFIELD

- evaluating spatial treatments (leave central strip untreated for biodiversity purposes), precision agriculture, from a strategic point of view (less herbicide use, more biodiversity etc.), not for tactical use (i.e. to decide where to spray)
- 3d competition models
- patches of weeds inside fields, especially for perennial weeds: where are they, how do they progress

#### SPECIES

- dominant species, association, communities, depending on climatic conditions, cropping systems, fragmentation of landscape
- possibility to add new species

### I.A.2. *software interface*

- maps as input and output, integration of spatial heterogeneities
- user interface must be easy to use
- data base connections for input variables, model parameters
- input of aerial photographs, gis. But as there are existing softwares that do that, it might be more important to have connections to existing gis softwares
- spatial framework where we can plug in different submodels, add new environments and species
- output maps with progress of different species over time
- for a given cropping system, field or spatial unit, progress over time
- illustrations ready for publication
- connection to other graphical software + statistics software: data formats that are easy to transfer, choice between different format for output
- sensitivity analyses: making variables vary automatically between simulations, stochastic choices
- simulation batches: to run lots of long simulations during nights and weekends
- output analysis for sensitivity analyses and risk analyses (i.e. if the decision maker is ready to accept a risk of 1%, what cropping system or spatial crop allocation or regional crop proportion or.... is necessary?)
- make factors vary and see result
- evaluation: comparison to existing data sets or models

- calibration: estimate parameter values for existing equations and model structure from new data bases (when changing regions, species, continents ...)
- description of the habits of farm equipment movements in landscapes
- locate farms, farm fields and collection silos etc on the maps because they determine farm traffic
- click on the map to input cropping systems or weeds, to see detailed output
- relation to gps and field assessments to input data
- different spatial details in a single simulation: certain fields are subdivided to detailed simulations while surrounding fields are kept as uniform areas
- add grass strips, hedges, etc on existing field patterns
- input birds and other wildlife in the region to know where we need to concentrate food reserves
- representation of a continent: vegetation types, major rivers, major traffic roads (motorways, aquatic transport, railways)
- characterization of semi-natural areas: where, what variables to describe the areas?
- initial state at simulation onset: which species to enter, possibility of virtual associations or virtual species, link with gps to get existing initial situations

## I.B. Competition

- in what sense do we predict?
- to what research purpose
- how do we account for competition in the model?

### competition models

- emergence timing, cohorts or individual modelling, different levels of precision depending on aim
- is timing important, plant height, root depth, leaf area
- temperature and moisture
- more detail in the models to predict variations
- variety, crop association
- must be integrated in multi-year dynamics models to integrate future indirect harmfulness
- competition for light, space, water and nitrogen
- spatial location of weeds, especially to integrate future effect of mechanical weeding
- is it possible to adapt light penetration models to herbicide penetration, depending on early competition, herbicide will not have the same efficiency. there can also be surviving plants with reduced growth so competition will also have more impact.
- critical question: perennials, spread of plants by growth and tillage

we can reproduce but not predict for a given field and year  
but we can do predictions based on probabilities

dual aim: research (understanding) + application for researchers + technical institutes, less for farmers  
triple aim: convince brussels that we need money to continue: identify gaps to orientate future research

### questions:

- does diversity decrease competition for the crop?
- what about cropping system effects: herbicides, mechanical weeding?