

Working Group Crop-Weed Interactions

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Developments in weed management and crop-weed
interaction research



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Weeds: reduction of crop production



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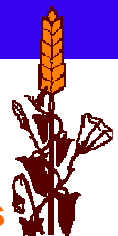


Quantify the size of this reduction

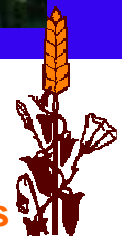
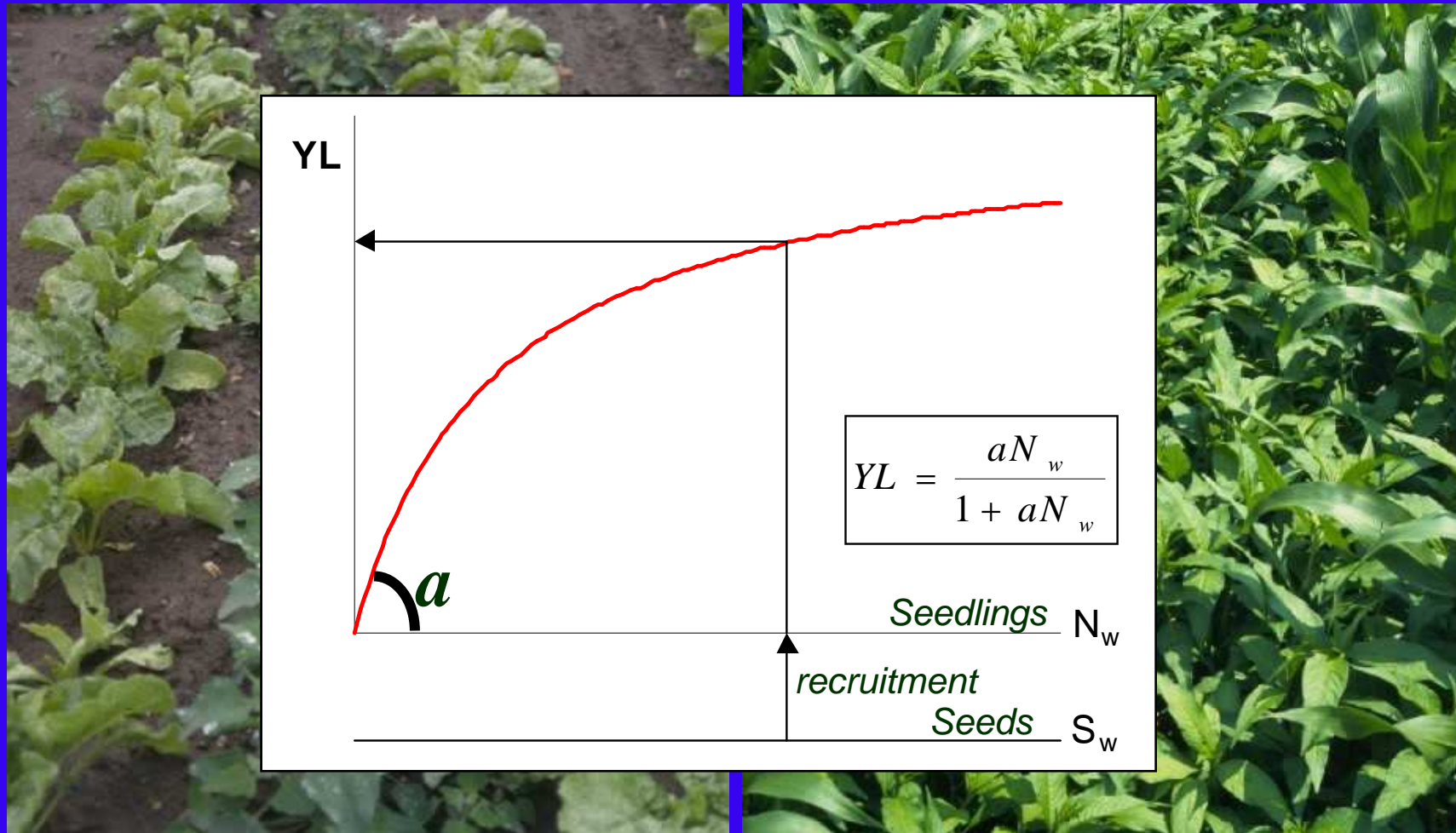
- Rational decision making on the use of herbicides

Requires:

- robust damage relationships
- based on early observation of weed infestation level

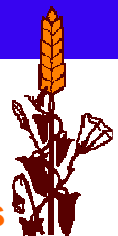


Weed density based model

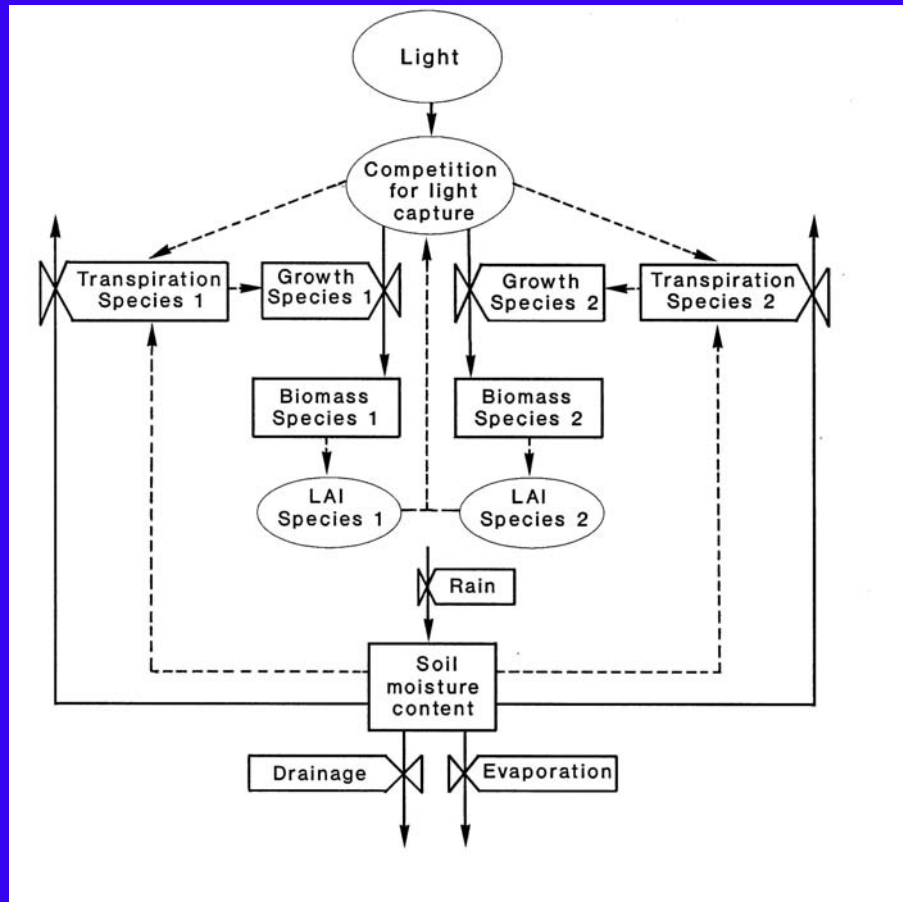


Limitations of descriptive models

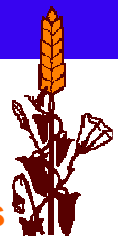
- Coefficients such as parameter a :
 - powerful description of outcome of a specific situation
 - descriptive rather than predictive
 - specific rather than general
 - lack the dynamics of underlying competition processes



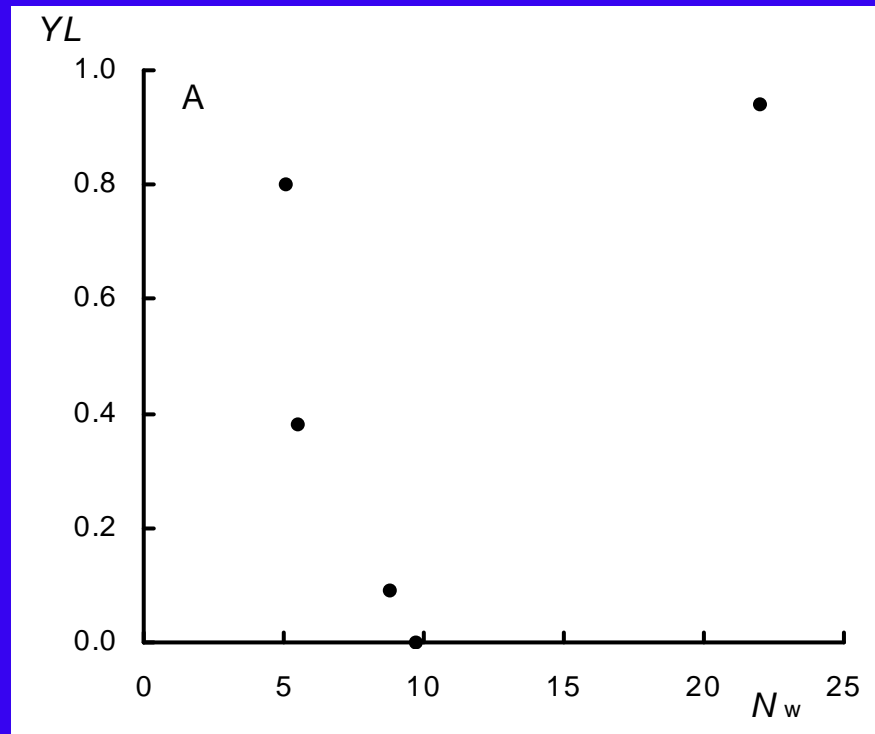
Mechanistic competition model



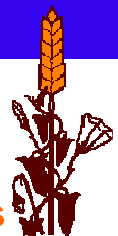
- Dynamic simulation of distribution of resources over competing species
- Main components:
 - number of growth models
 - sub-models for resource-distribution
- Requires many parameters:
 - focus on derivation of generalities



Application: analysis of experiments

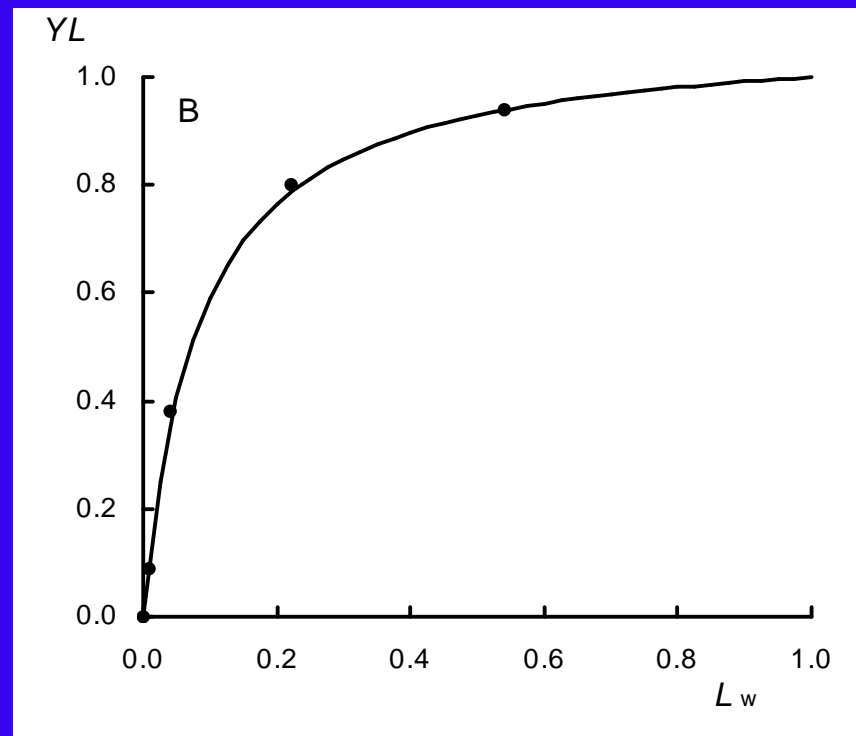
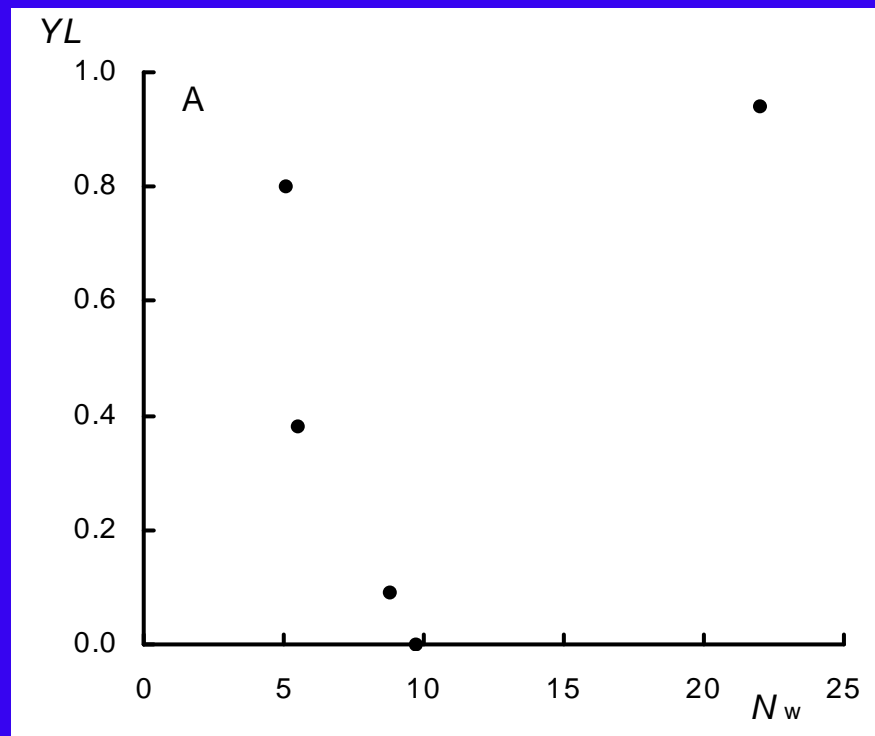


- Analysis and interpretation of experiments
- Five experiments with sugarbeet and *Chenopodium album*
- Weed density (N_w) poor predictor of yield loss



Relative leaf area offers more perspective

L_w : relative leaf area 30 days after sowing



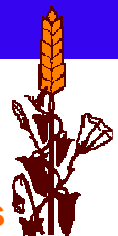
Relative leaf area model

- idea:
 - to account for relative time of weed emergence
 - to account for different weed flushes

- $YL = qL_w / (1 + (q-1)L_w)$

problems encountered:

- L_w is difficult to determine
- q varies with time of observation



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- Conducted common experiments
 - Aims:
 - to compare descriptive ability of relative leaf area model and weed density model
 - to assess predictive ability of these models
- multi-location testing due to participation of members around Europe (+ Canada) a major advantage!

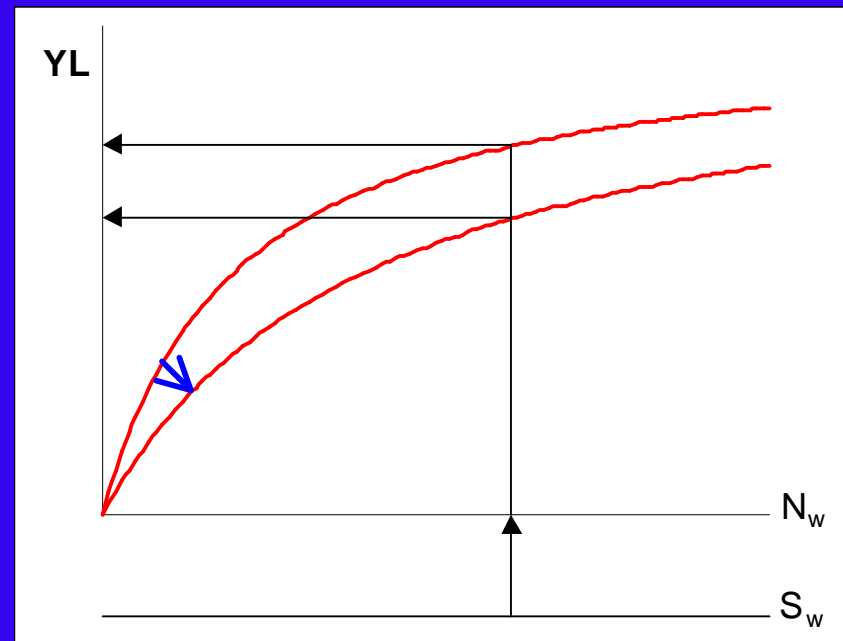
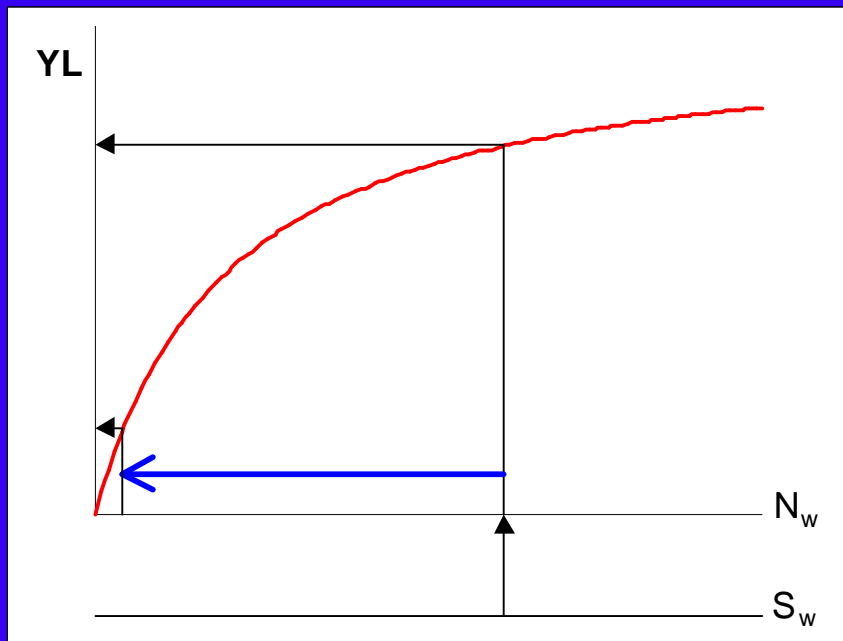


New developments

- Need for reduction of herbicide use
 - Management of weed populations, rather than just curative control
 - increased importance of cultural control measures
 - increased appreciation of long-term consequences
- New challenges for crop-weed interaction research



Weed management



From curative control → Cultural control measures



Alteration of competitive relations

■ Main options

- at individual plant level
 - increased competitiveness of individual crop plants
→ e.g. competitive cultivars, transplanting
- at plant population level
 - increased ratio crop:weed plants
→ e.g. increased sowing rate
 - improved spatial arrangement
→ more uniform distribution



Integrated weed/crop management

- Aspects related to optimum row width
 - earliness of canopy closure
 - possibility to hoe
 - trade-off on yield

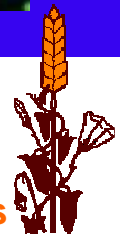


Intercropping to suppress weeds



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Optimisation process around competition

Determine optimum:

- plant density
- mixing ratio

with respect to:

- weed suppression
- yield
- plant quality

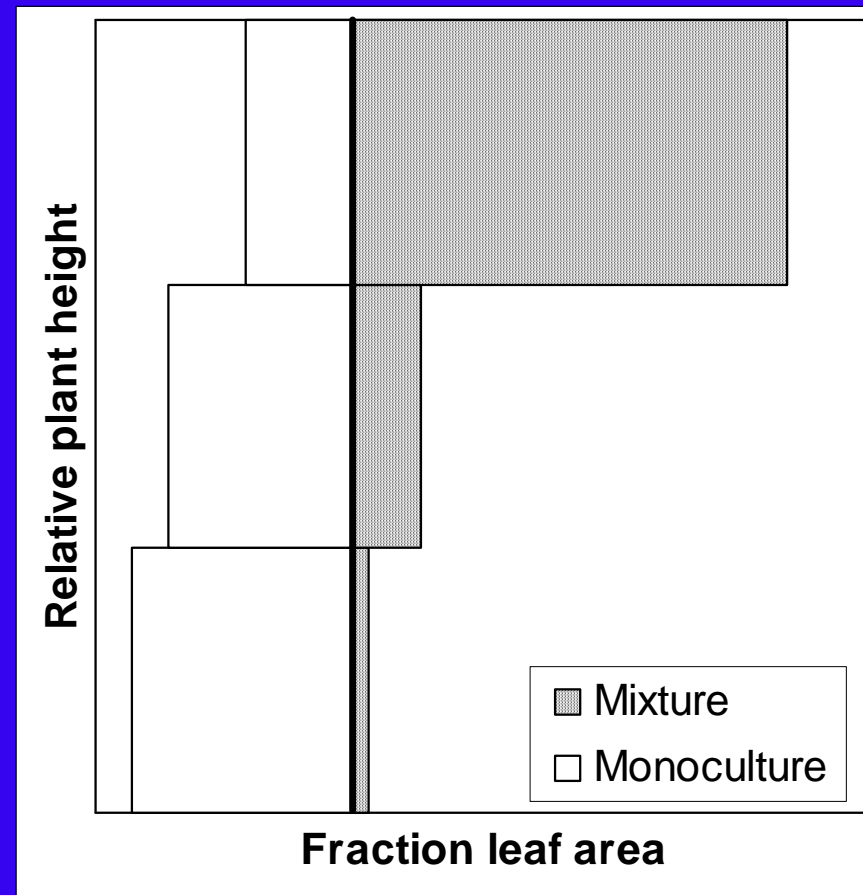
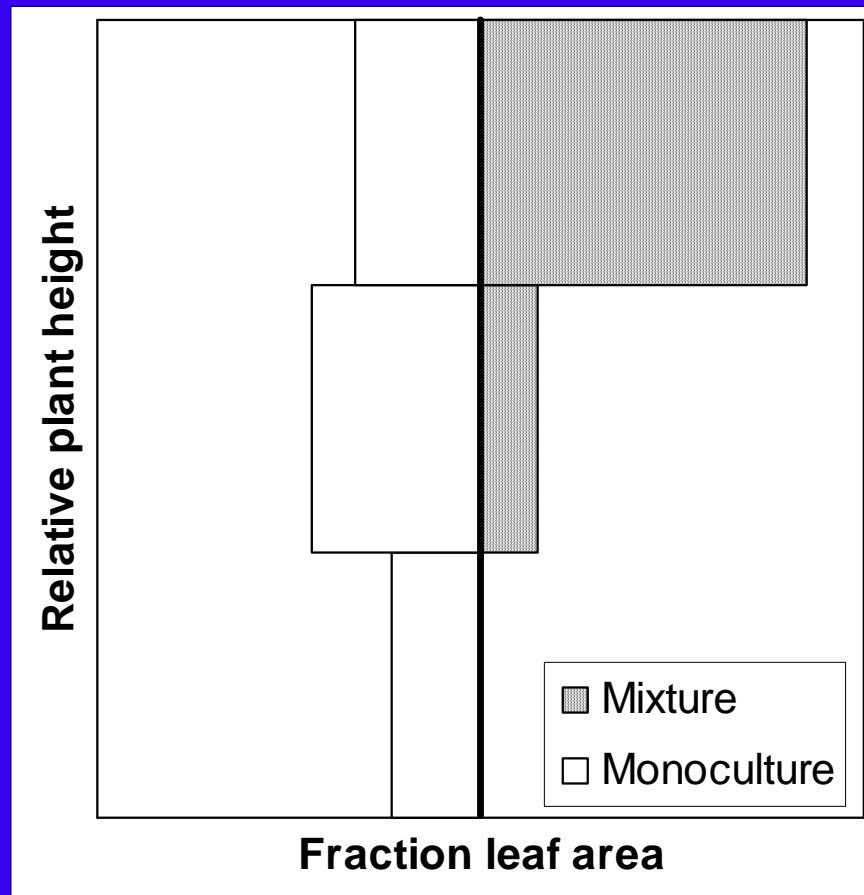


Focus on long term development

- Population dynamics of weeds
 - competitive effect of crop on weed
 - weed seed production
 - rotational aspects



Response of weeds to competition



Weed seed production



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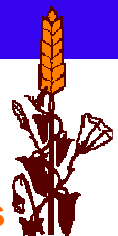
New decision support systems

Not just on

- single season
- decision to spray or not
- which compound

but also on

- consequences for long term development
- adjustment of cropping practices



Working group Crop-Weed interactions

- From joint experiments
 - focus on development of robust relationships for decisions on herbicide application
- Towards a platform for exchange of ideas
 - focus on various aspects related to crop-weed interactions and implications for weed management (workshops Viterbo-2003 and Rothamsted-2006)



Workshop Viterbo - April 2003

- Session 1
 - Enhancing crop competitive ability
- Session 2
 - Related working groups
- Session 3
 - Crop-weed competition and population development
- Session 4
 - Increased biodiversity and weed suppression



Workshop Rothamsted - September 2006

- Session 1
 - Enhancing crop competitive ability: genetic aspects and mechanisms
- Session 2
 - Increased diversity and crop competitive ability
- Session 3
 - Cultural and direct weed control measures
- Session 4
 - Weed management in a cropping systems context
- Two-days modelling course
 - Modelling crop-weed interactions: principles and applications



Workshop Seville – April 2008



Mid-2007 more information will be available on the
website of the Working Group
Crop-Weed Interactions



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