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The ability of various winter wheat genotypes to suppress weeds in consideration of their developmental dynamics and morphological traits in an organically managed field

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weed suppression

= ability of genotypes to suppress weed growth as well as their generative and vegetative reproduction. (anatomic, morphological, physiological, dynamics of development)

≠ weed tolerance (yield a similar large crop independently of weed pressure)

Aims:

- Determination of the influence of wheat growth dynamics and shoot morphology on suppression ability of weeds (verification of known traits)
- Identification of parameters useful for breeding (e.g. easy to detect..)

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materials & methods

- 3 field experiments - eastern Vienna, Austria (48°11´N, 16°31´E)
- 540mm/a, loamy sand to sandy loam
- 3 periods: 2004/05 – 2006/07
- fully-randomised plot experiment with 4 replicates
- natural weed flora
- none agronomic manipulation after wheat cultivation
- up to 15 wheat genotypes

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wheat- & weed- parameters

- aboveground biomass
- ground cover density
- canopy height
- leaf weight ratio
- growth & leaf habit
- etc.

- ground cover density
- aboveground biomass = indicator for suppression ability of wheat genotypes

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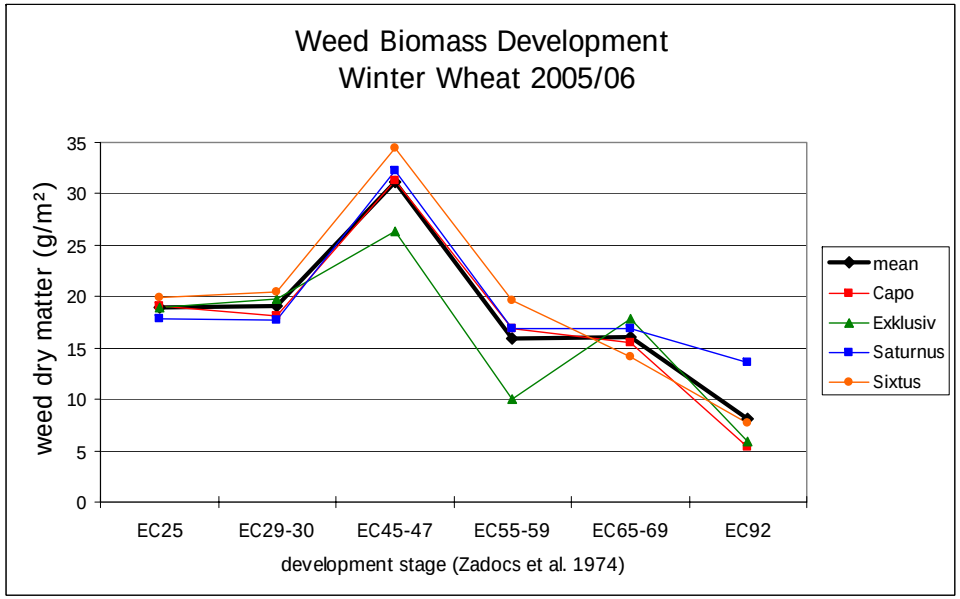
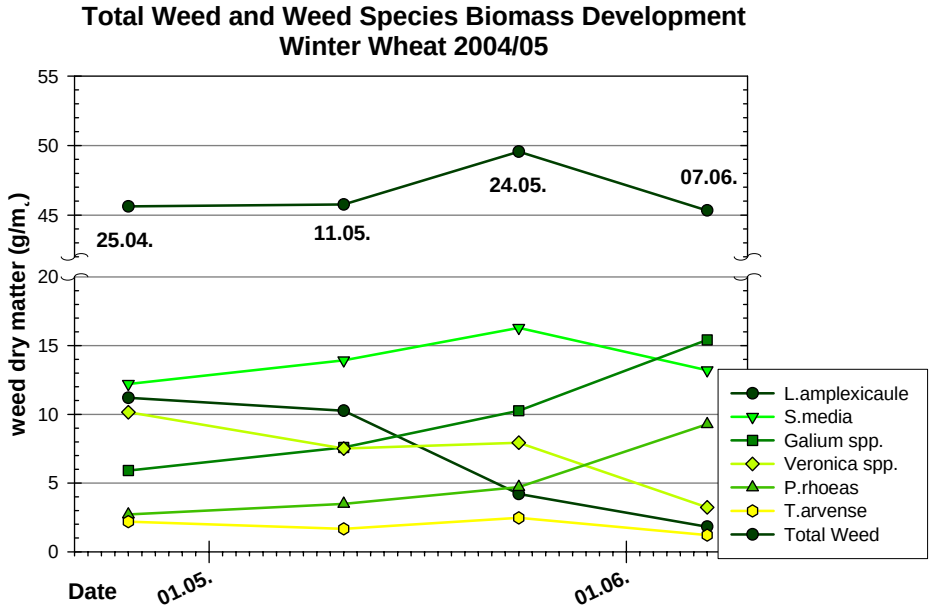
weed species:

- Stellaria media
- Galium aparine, G.spurium
- Lamium amplexicaule
- Papaver rhoeas
- Veronica spp.
- Thlaspi arvense
- Sinapis spp.





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factor	variable	p-value
year	ratio of weed biomass to total biomass - beginning of shooting	0,000
	weed biomass at ear emergence	0,000
genotype	ratio of weed biomass to total biomass - beginning of shooting	0,158
	weed biomass at ear emergence	0,028
year x genotype	ratio of weed biomass to total biomass - beginning of shooting	0,451
	weed biomass at ear emergence	0,245

→ weed biomass dependent on year

→ significant differences in weed biomass at ear emergence between the genotypes

→ none interaction of experimental years and genotypes

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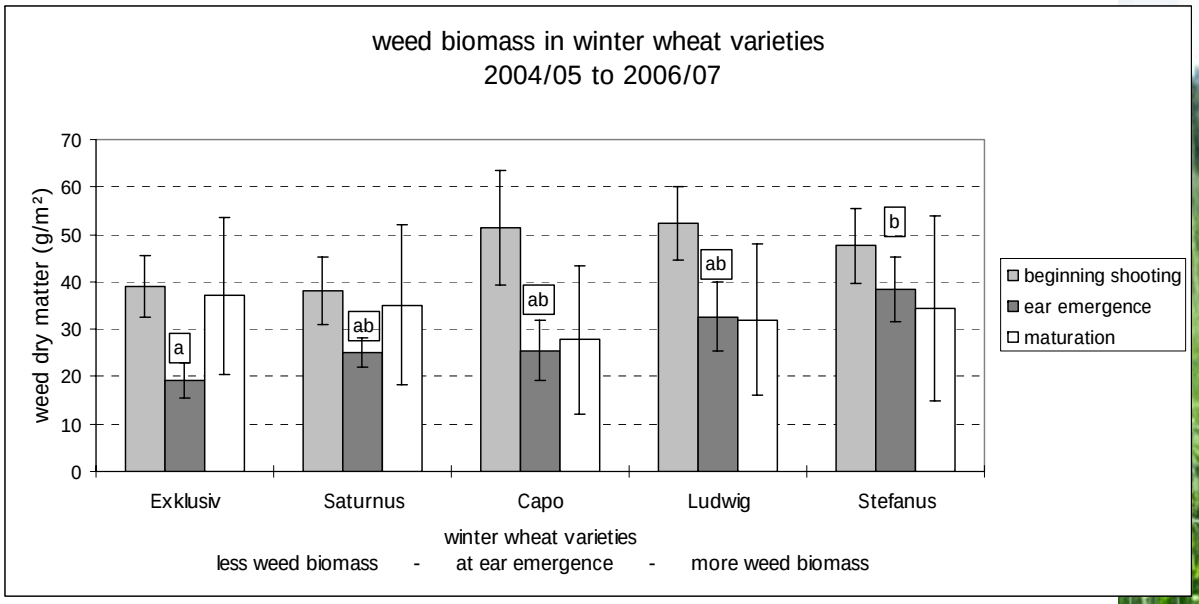

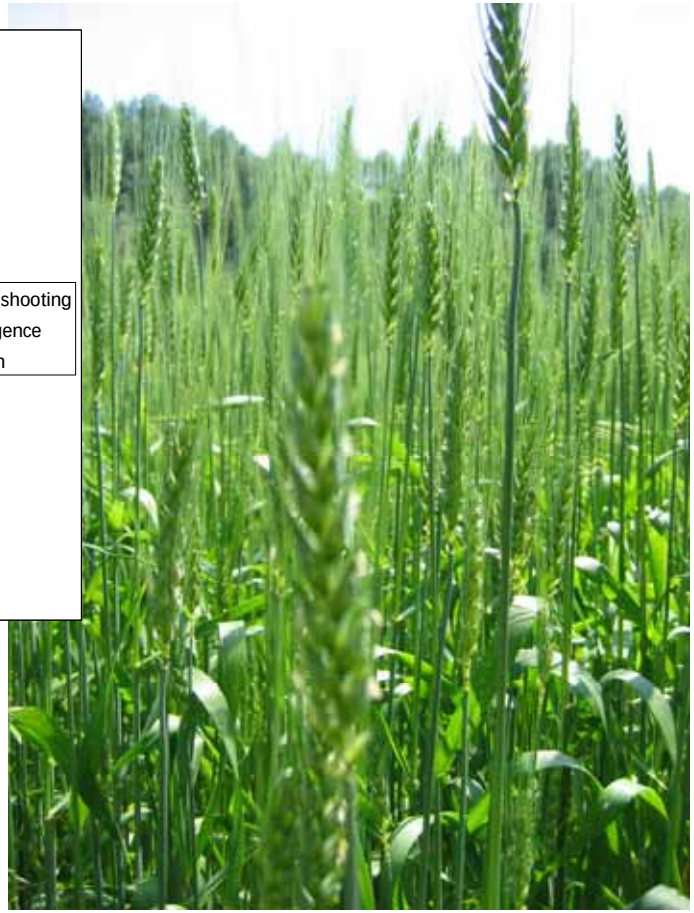

weed suppression ability:

Stefanus < Ludwig < Capo ≤ Exklusiv < Saturnus

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weed biomass

beginning of shooting

- shoots per m² r=-0,56
- canopy height r=-0,52
- leaf orientation r_s =-0,40

Relative Growth Rate at shooting until ear emergence

- canopy height r=-0,56
- leaf weight ratio r=-0,52

- dynamics of development

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Conclusions

- **Choice of wheat varietiy is an useful option for weed regulation**
- **As a precondition - good knowledge about:**

  (i) site conditions - soil, species of weed flora, climate etc.

  (ii) dynamics of development - canopy height, biomass

  (iii) morphological characteristics at specific development stages
- **Characteristics supporting weed suppression ability:**

  (i) early growth development – mainly at beginning of shooting until ear emergence (canopy height, leaf orientation, number of shoots with many or big leaves).

  (ii) strong competitors throughout the vegetation period (aboveground biomass, leaf orientation)

- **Determination of weed suppression ability at ear emergence**

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