

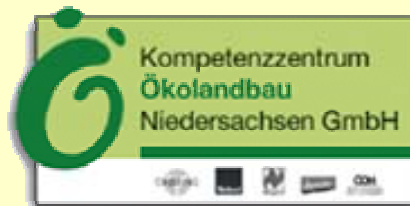
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BÖLN

Bundesprogramm Ökologischer Landbau
und andere Formen nachhaltiger
Landwirtschaft



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GLS *Treuhand*
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Cereal Breeding Research Darzau

Organic Winter Pea Breeding

- Where about is Darzau
- Why breed Winter Pea in Northern Germany
- How to breed Winter Pea under organic conditions
- Results of ongoing research projects
- What are the challenges
- Outlook to the future

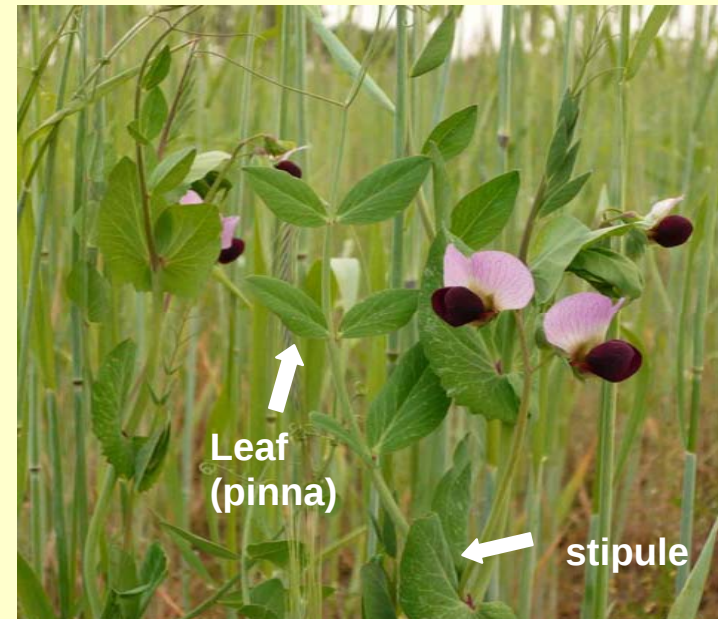
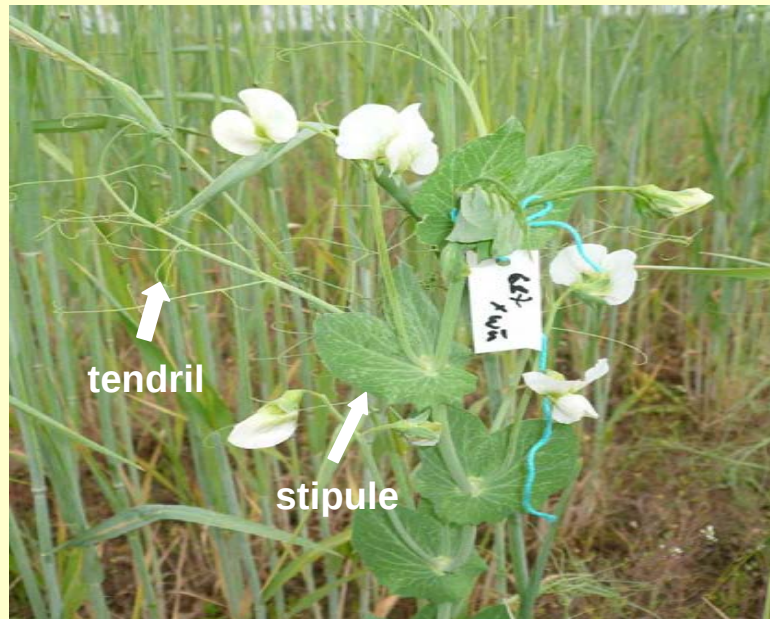


What CBRD does

- Development of selection criteria for wheat, barley, oat, einkorn and pea under organic conditions for organic farming systems
- Realisation of new varieties for organic farmers and Processors



Different types and origins of winter Pea



white colour seed and dark colour seed



Why breeding Winter Peas

Advantages

- Winter pea adapted to dry conditions
- Advanced plant- and root developing
- Intensive tillering = basal branches
- Outperforming spring sowing peas in grain, biomass and CP yield
- Adapted to unfavourable harsh conditions – makes it more robust
- Tolerant to late sowing

Disadvantages

- Damages or winterkill due to bare frost or long snow cover
- Lodging
- Weed pressure
- Weak competition ability to cereals or other crops in mixtures
- Disease pressure due to the long growing period and sticking to the soil over winter

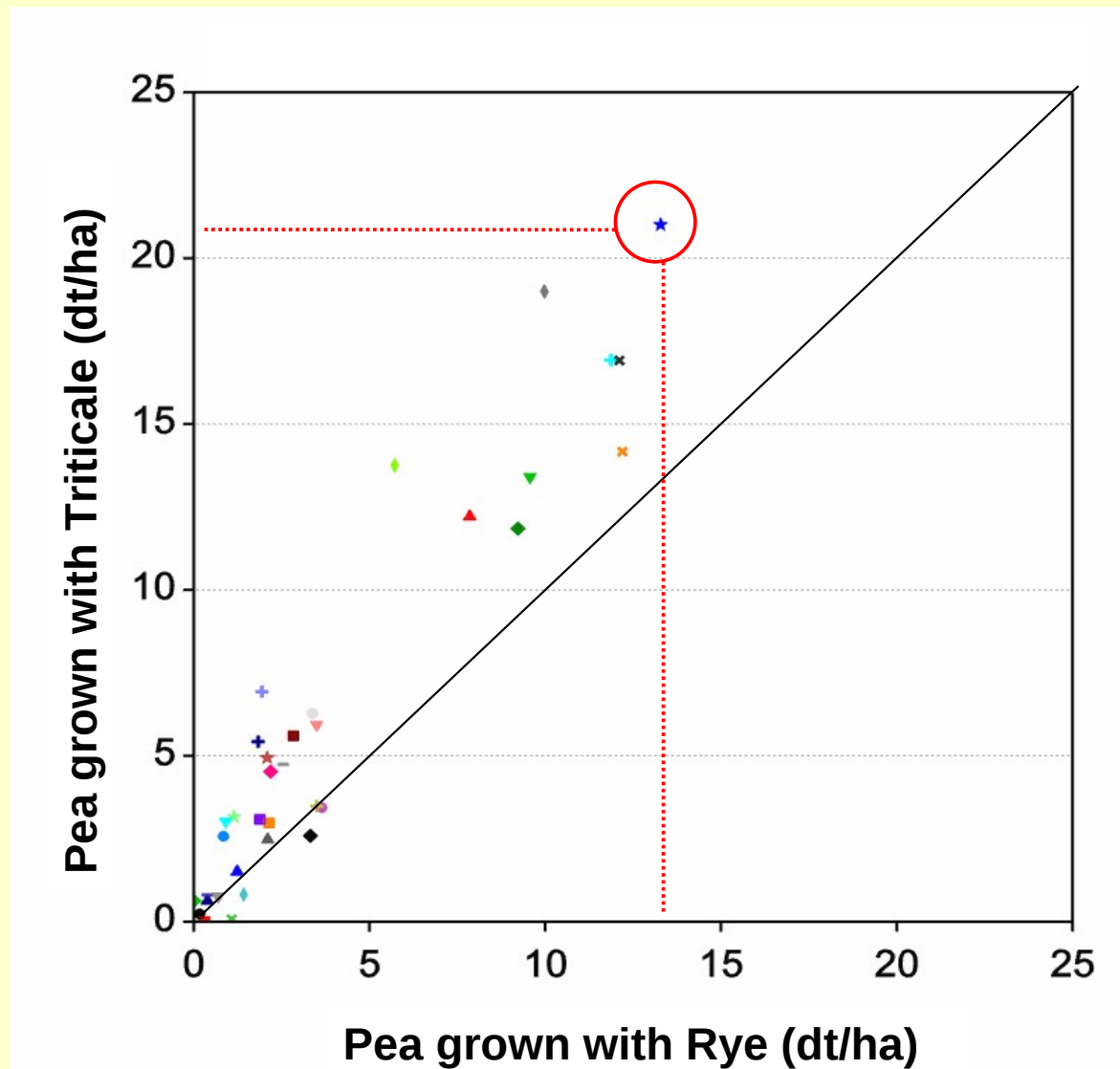


Selection and research criteria for protein grain pea (animal feed) under organic conditions

- In general: organic agriculture does not use any chemical seed treatment, so it is very important to look for resistant plants to soil borne and seed borne diseases
- Winter hardiness – frost tolerance – esp. long snow cover and bare frost
- Selection for intercropping or cropping in mixture
- Optimal Seed density
- High ground cover
- Competition ability
- High fieldresistance to Pea diseases
- High grain yield
- High protein yield
- Phenotypical traits relevant to organic agriculture



Pea net yield grown in mixture with Triticale and Rye



Competition



Rye



Triticale



Different locations and mixture partners lead to different overwintering rates

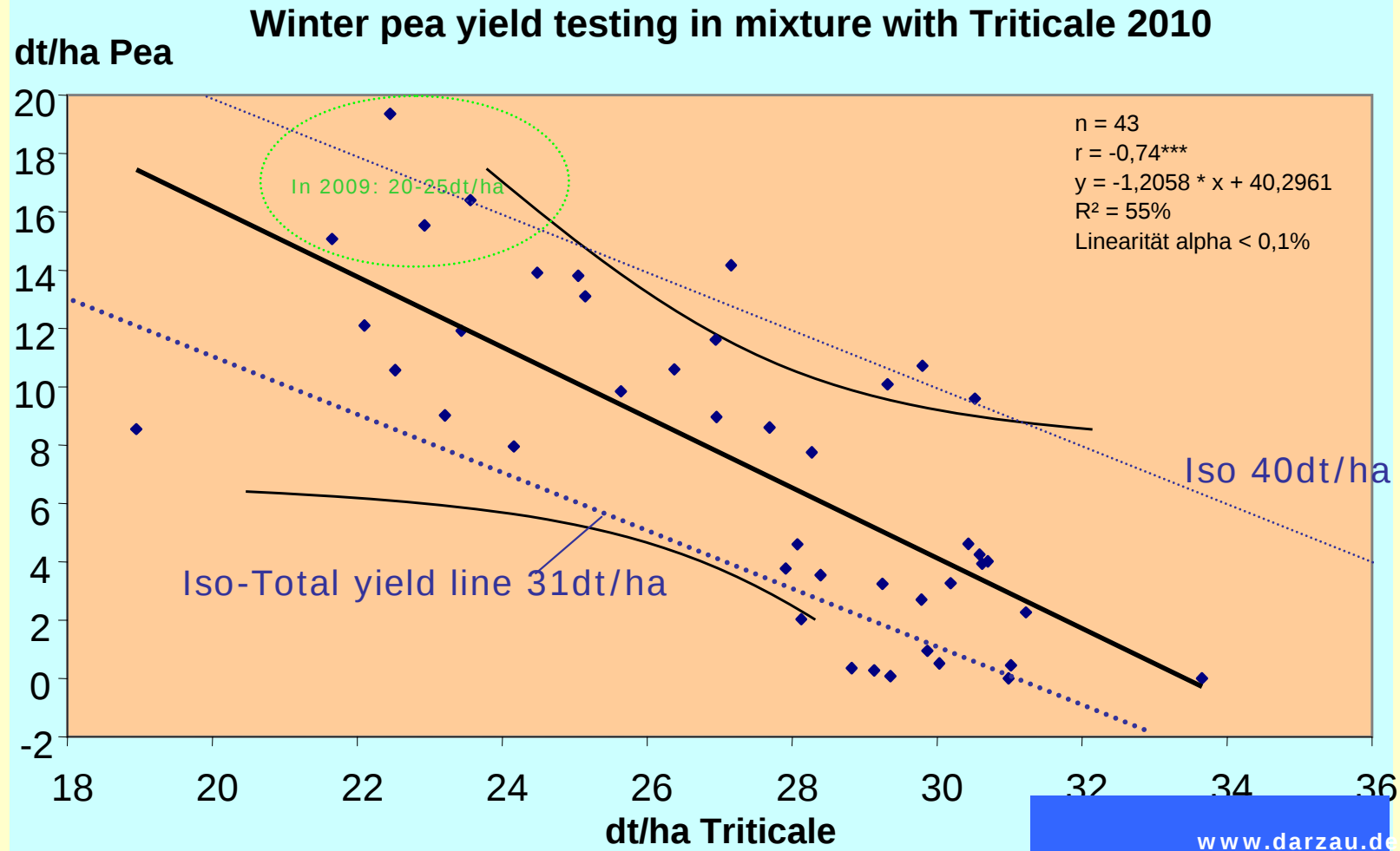
Overwintering rate: ratio of plants emerged in autumn to plants still alive in spring. Also: Rating or counting alive branches and leafs

Overwintering in Triticale better then in Pure Stands or with other crops

Overwintering may be depends on the soil conditions like nutrient level and micro climate in mixture not only on harsh weather conditions.



Pea and Triticale net yield from mixture



Sowing density 40 K/m² of Pea and 150 K/m² of Triticale.
The more pea yield the fewer triticale yield and vice versa

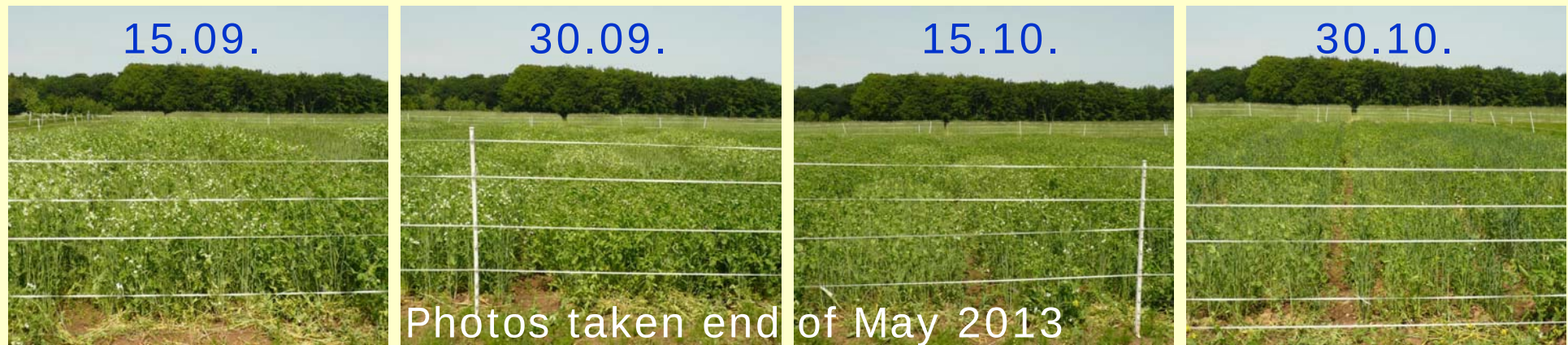


Crude Protein

semileafless types might contain less CP than normal leaf types, but not only the plant type might be influencing the content of CP also the length of the growing period



Different sowing dates



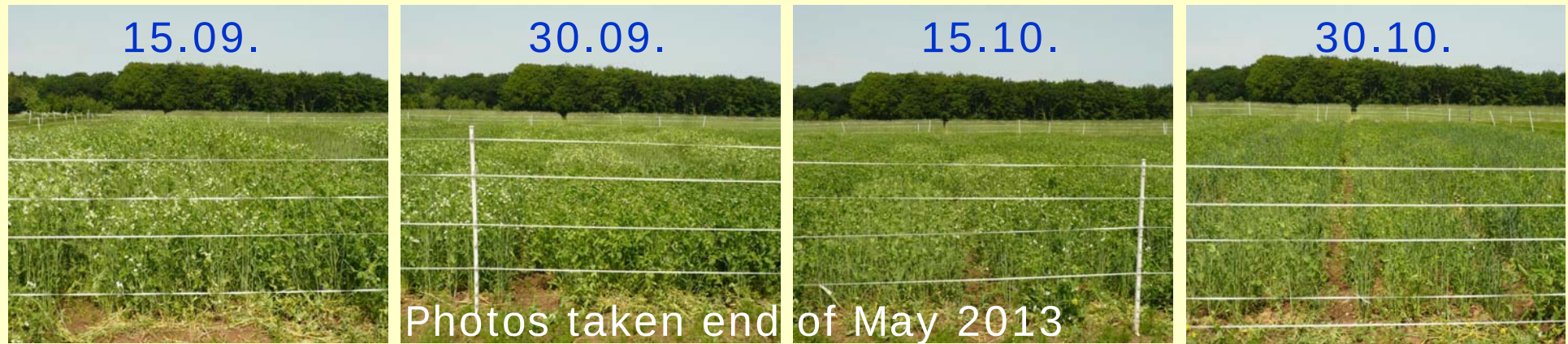
The later sown the better is the overwintering? Literature - Urbatzka 2010 – stated that, but is it the same for all genotypes, for white and colour flowering and for really harsh winter?

In 2013:

- the later the fewer internods till the first flower
- the later the higher is the TKW – bigger seeds
- the later the more seeds per pod
- the later the lesser basal branching – less density – less lodging
- the later the shorter the Plants – less lodging
- the later the fewer biomass - but higher kernel yields



Different sowing dates



Pea in mixture with Triticale	Mid Sept	End Sept	Mid Oct	End Oct	Isd 5%
Mean Yield dt/ha	25,1	29,4	26,7	18,9	1,8
Shares % of Peas on mix	77	75	68	49	3
Sowing density: Pea - 60 seeds/m ² - Triticale (Benetto) - 100 seeds/m ²					

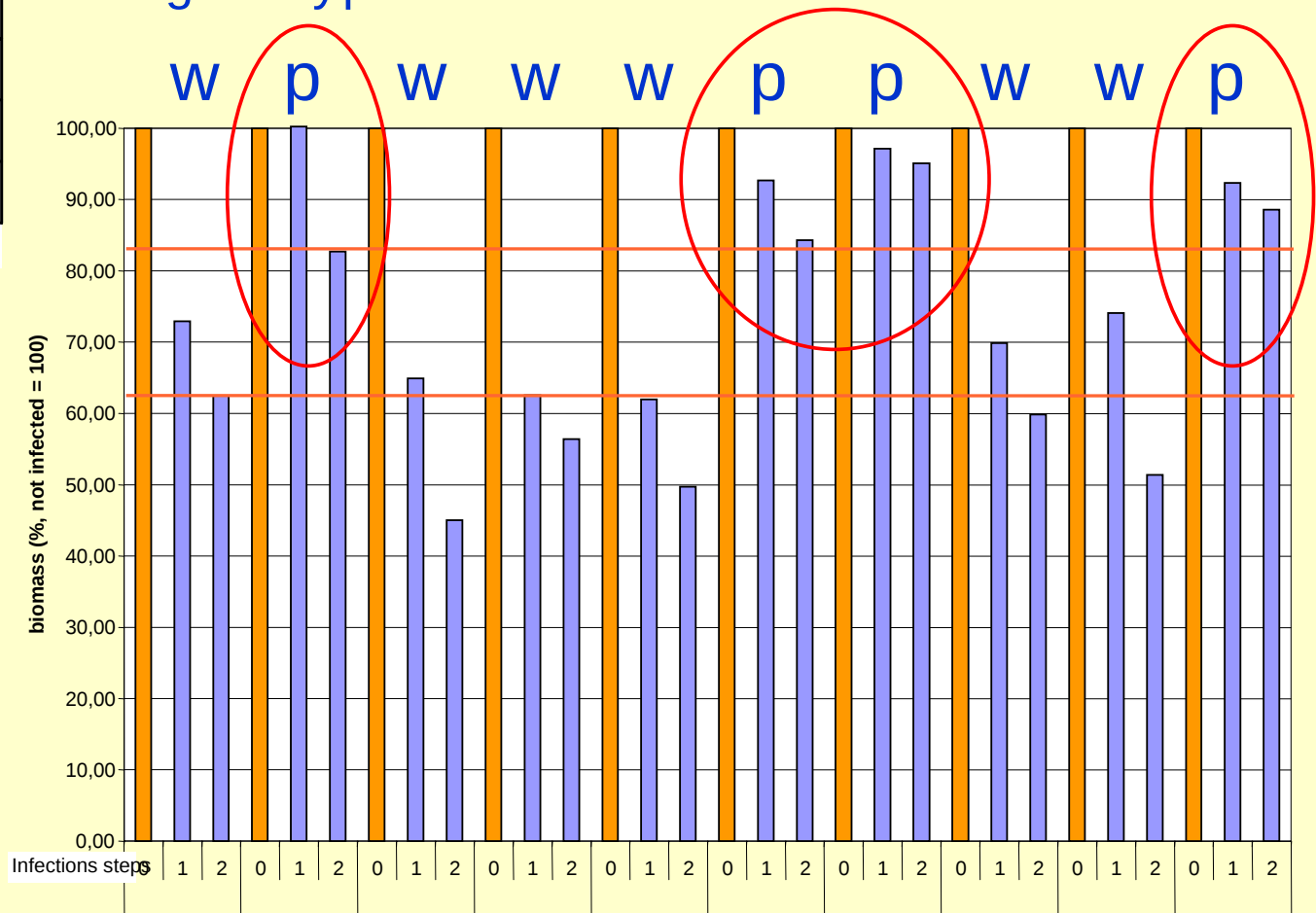


Field emergence influenced by susceptibility to *Phythium*?

Field emergence in percent of planted seeds		
Colour of Flower	purple	white
Leaftype		
sl	78,2 c*	68,5 b
nl	82,3 c	57,8 a

*different letters refer to significant difference for $p < 0,05$

Evaluation of biomass decrease after infection with *Phythium ultimum* for different genotypes



(Source: Bruns 2012 – preliminary report: Importance of fungal diseases in organic cultivation of winter peas)



Disease Tolerance

Susceptability to *Phoma medicaginis* - pot experiments



Roots from selected lines after infection by *P. medicaginis*; Images represent a pot with max. 8 Plants (Source: Bruns 2012 – preliminary report: Importance of fungal diseases in organic cultivation of winter peas.)



What should be done next

- Different Countries different diseases?

Phoma medicaginis, *Fusarium spp.*, *Mycosphaerella pinodes*, *Ascochyta pisi*, *Phytium ultimum*, *Thielaviopsis basicola* (caning peas), *Rhizoctonia solani*, *Sclerotinia sclerotiorum* ... *Aphanomyces*

- How to improve the screening for seed and soil borne diseases in the field or with low afford under controlled conditions
- Increasing the frost tolerance for bare frost
- Increasing symbioses potential from Rhizobia for N-Fixation or Mycorhiza for disease resistance
- Optimisation of the cultivation of winter pea



Many thanks for your attention



For further questions contact

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