Ersatz von Kupfer im biologischen Kartoffelanbau: BLIGHT-MOP (2001-2005)

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Research Institute of Organic Agriculture

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Partner institutions in Blight-MOP

- University of Newcastle (UK)
- Research Institute of Organic Agriculture (CH)
- Institut National de la Recherche Agronomique (F)
- University of Kassel (D)
- Elm Farm Research Centre (UK)
- Institute of Agricultural Sciences (DK)
- Biologische Bundesanstalt (D)
- Federal Reserch Station of Agroecology and Agriculture (CH)
- Centre for Ecological Agriculture (N)
- Louis Bolk Institute (NL)
- Group de Recherche en Agriculture Biologique (F)
- Plant Research International (NL)
- Agricultural Economics Institute (NL)

Inhalt

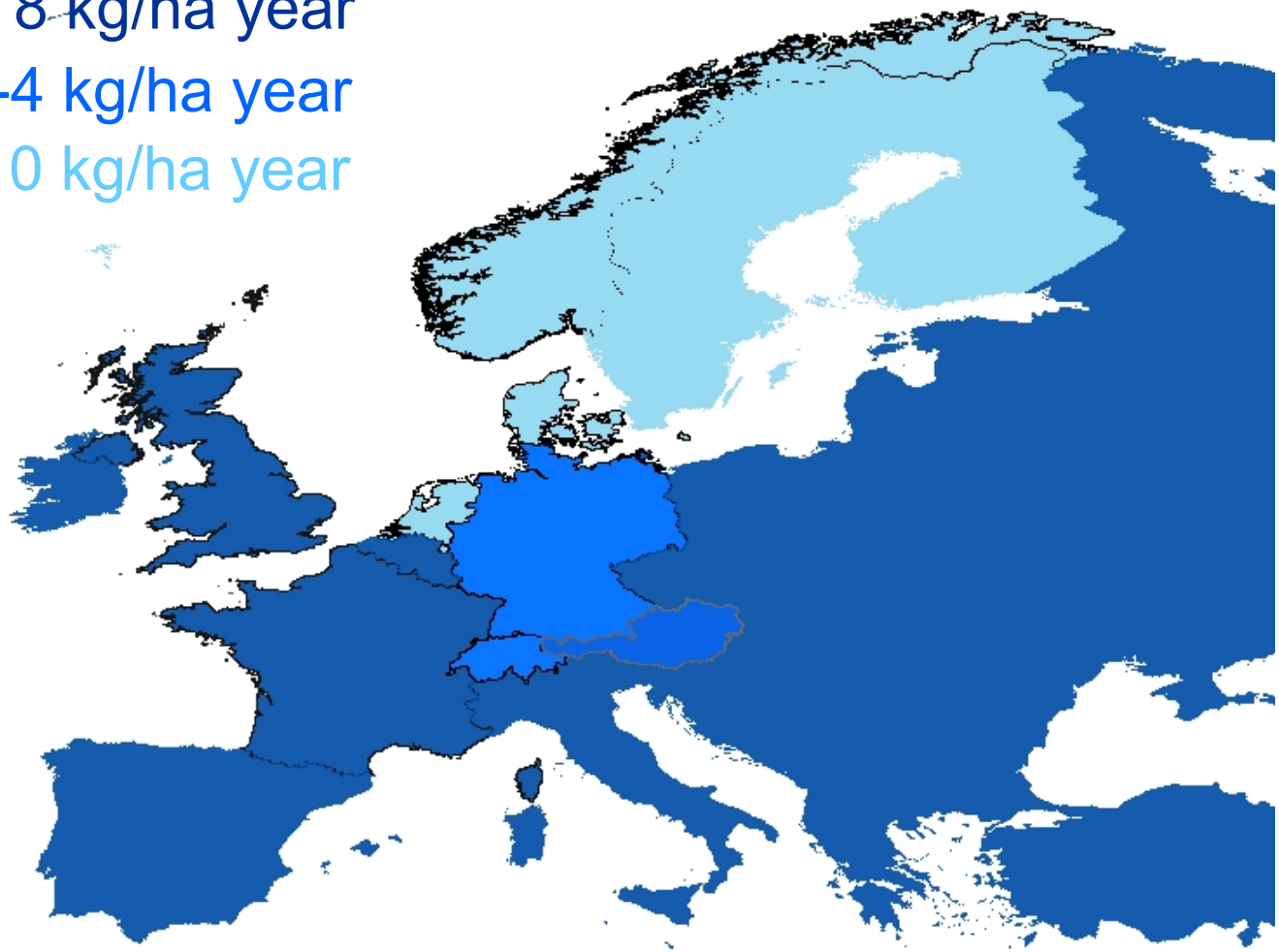
- **Gesetzliche Rahmenbedingungen und wirtschaftliche Bedeutung von Phytophthora infestans**
- **Produktionstechnik im biologischen Kartoffelanbau in Europa**
- **Strategien zur Verbesserung des Anbaues**
- **Integration von mehreren Einzelstrategien**
- **Standortbezogene Anpassung und Anwendung**
- **Prüfung von optimierten Systemen on farm**

Kupferzulassung in Europa

Max. 8 kg/ha year

Max. 3-4 kg/ha year

0 kg/ha year



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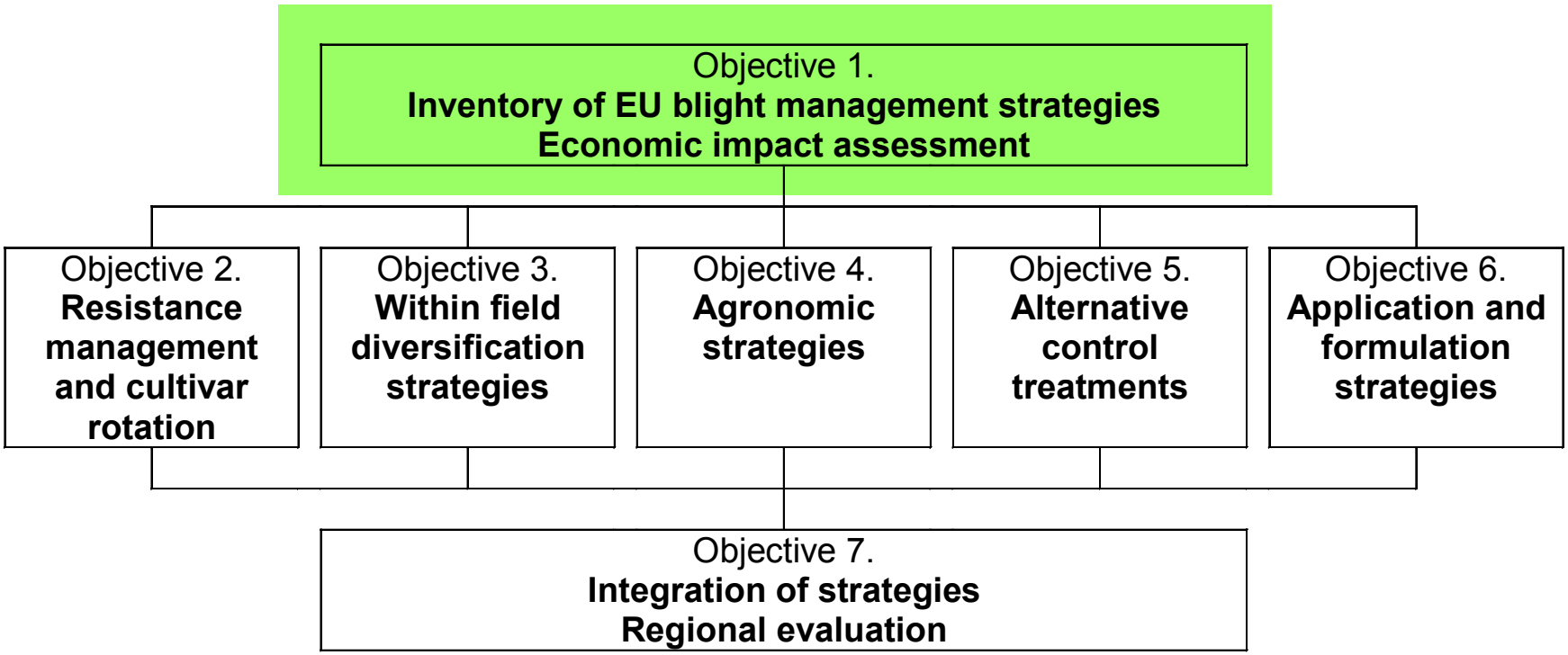
Konzept von Blight - MOP



Survey and background data

7 countries and app. 20 researchers involved

118 farmers interviewed

131 questions asked (interviews only)

729 Variables processed and analysed (interviews only)

12 researchers gathered and processed background information on economy/epidemiology

Erwartete Auswirkung eines Kupferverbotes

		SURFACE development			
		decrease	neutral	increase	Total
country	Denmark		100.0%		100.0%
	France	71.4%	21.4%	7.1%	100.0%
	Germany	35.7%	64.3%		100.0%
	Netherlands	5.6%	83.3%	11.1%	100.0%
	Norway		100.0%		100.0%
	Switzerland	61.1%	38.9%		100.0%
	United Kingdom	57.1%	42.9%		100.0%
Total		31.0%	66.4%	2.7%	100.0%

Organic potato production

Table 3.7. Area organic arable farming and organic potato area (1998). Source: FAOstat and Lampkin et al., 2000, Own data from national administration and certification bodies

	Denmark	France	Germany	Netherlands	Norway	Switzerland	United Kingdom
Total organic arable agricultural area (ha)	38'787	35'900	140'000	4'948	1'045	4'366	8'248
Total organic potatoes (ha)	755	579	4'700	749	125	500	911
Total potatoes (ha)	36'000	164'000	297'267	126'528	16'900	13'866	164'100
Percent potato in organic crop rotation	1.95%	1.61%	3.36%	15.14%	11.96%	11.45%	11.05%

Average yields in potato production

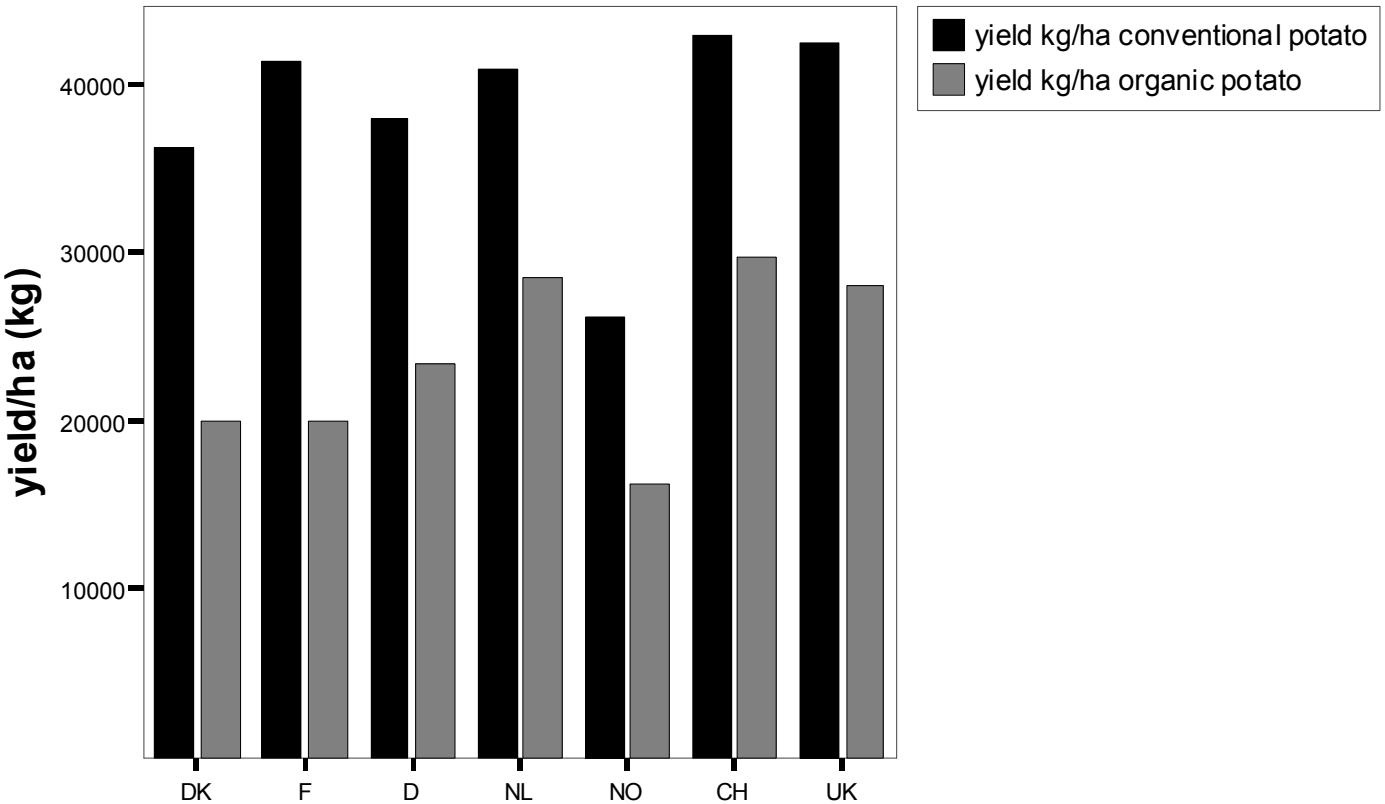


Figure 3.2. Average yields of conventional and organic ware potatoes per country (harvested kg/ha; 1998-2000)[1]. Source: Own data from the processors and traders. (Norway: organic yield as given in farmers' questionnaire)

Average farm gate prices of potato

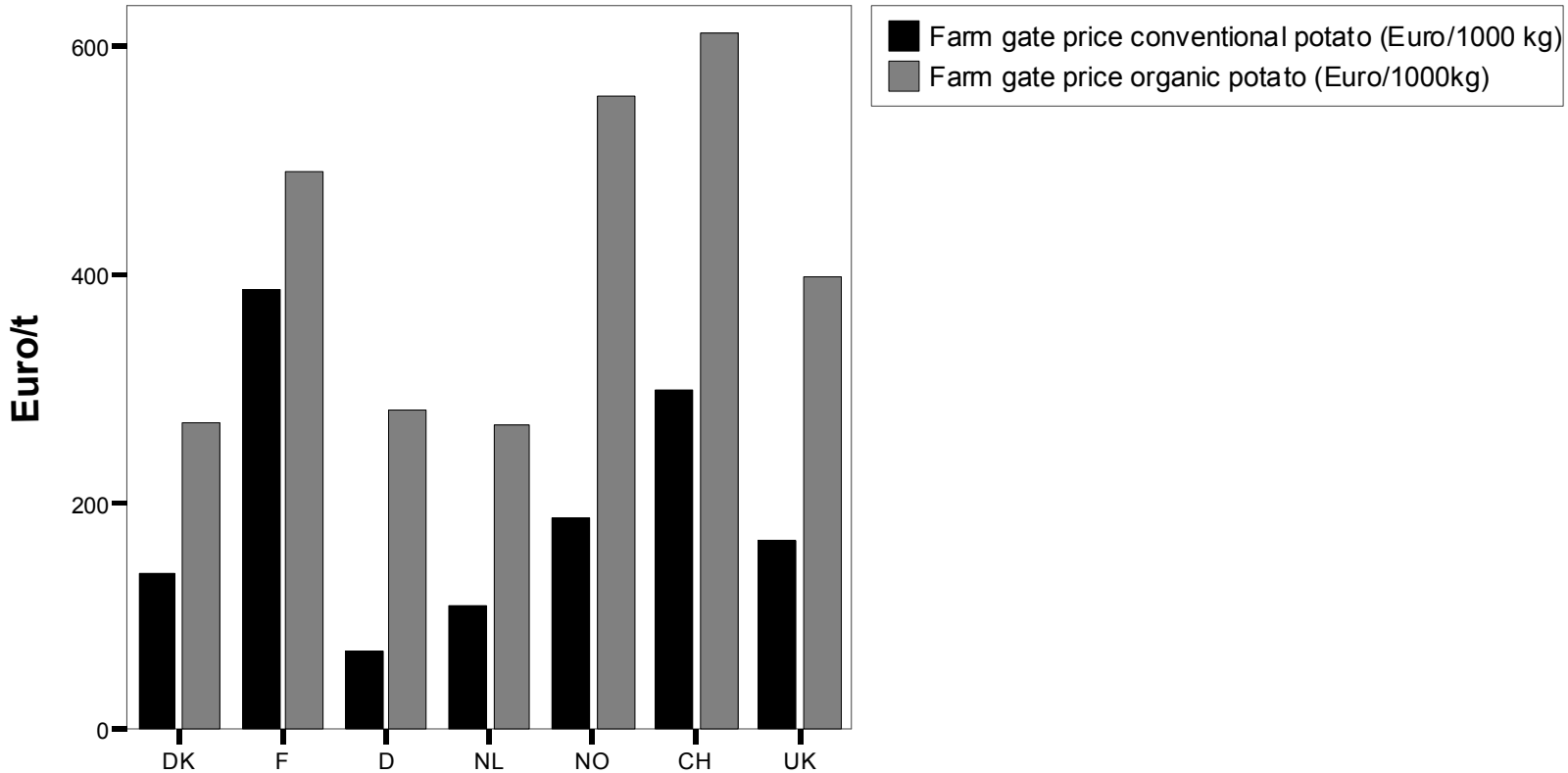


Figure 3.3. Average farm gate prices of organic and conventional ware potatoes (1998-2000; Euro per ton)[1]. Source: Own data from the processors and traders

Monetary output per hectare

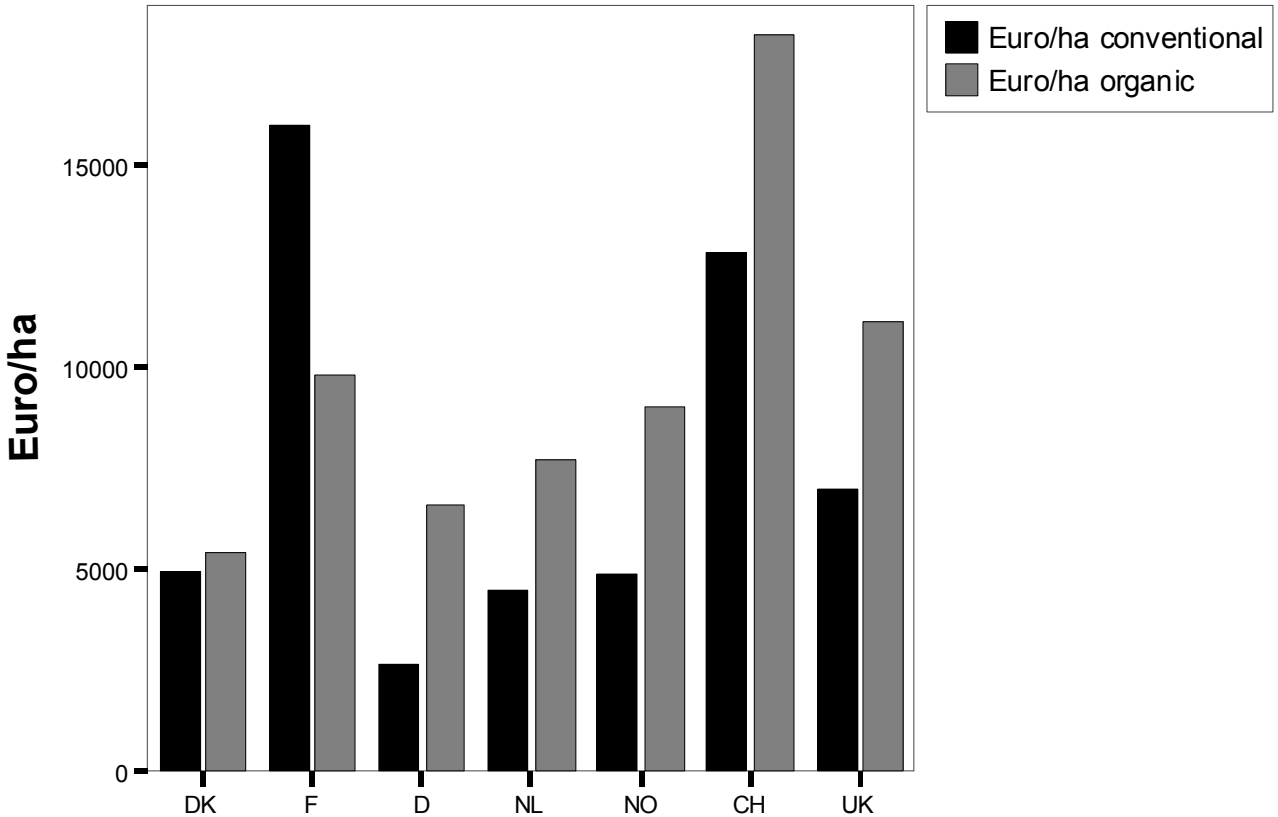
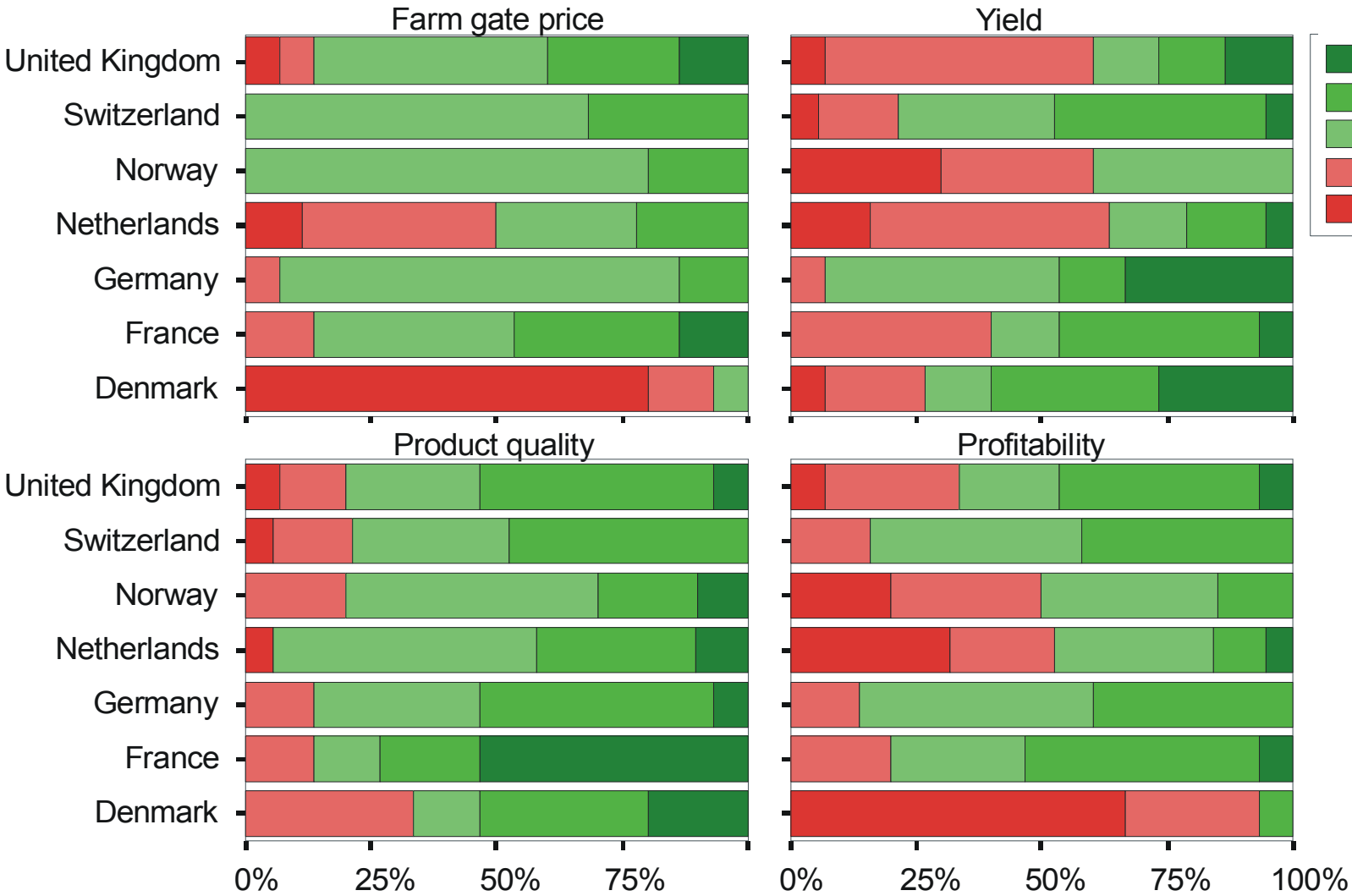


Figure 3.4. Average monetary output of organic and conventional ware potatoes (1998-2000). Source: Own data from the processors and traders

Farmers‘ assessment of 2000 crop



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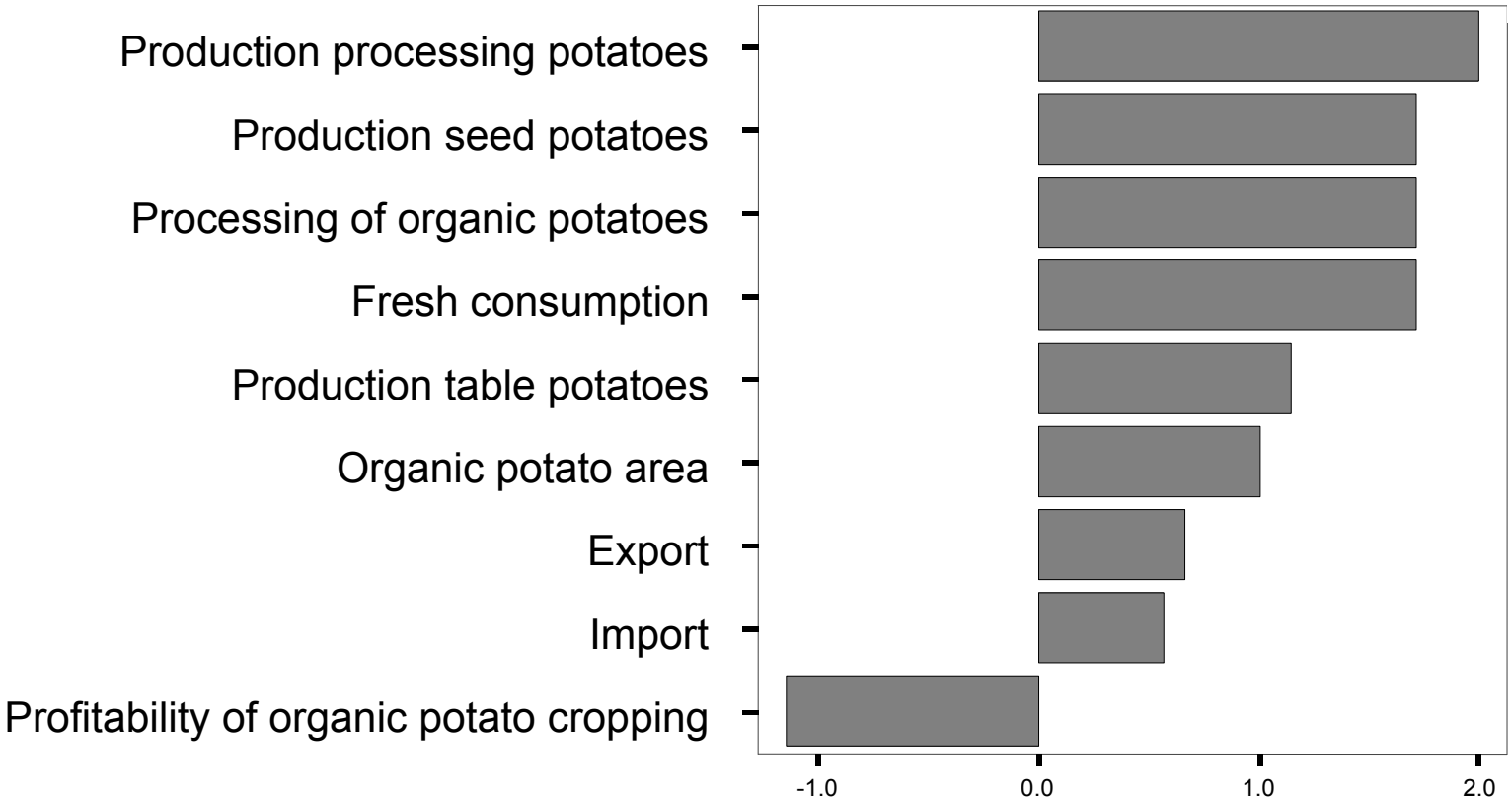
Expected market development



Schlussfolgerungen I

- Grosse Unterschiede in den gesetzlichen Rahmenbedingungen
- Stand 2000: Kupferverbot ohne Altenativstrategien wird den Bioanbau von Kartoffeln in der EU reduzieren, aber nicht eliminieren
- Biokartoffelanbau ist klein, hat aber Wachstumspotential
- Engpässe: Produktionskosten, Ertragssicherheit, Akzeptanz von Sorten

Inhalt

- Gesetzliche Rahmenbedingungen und wirtschaftliche Bedeutung von Phytophthora infestans
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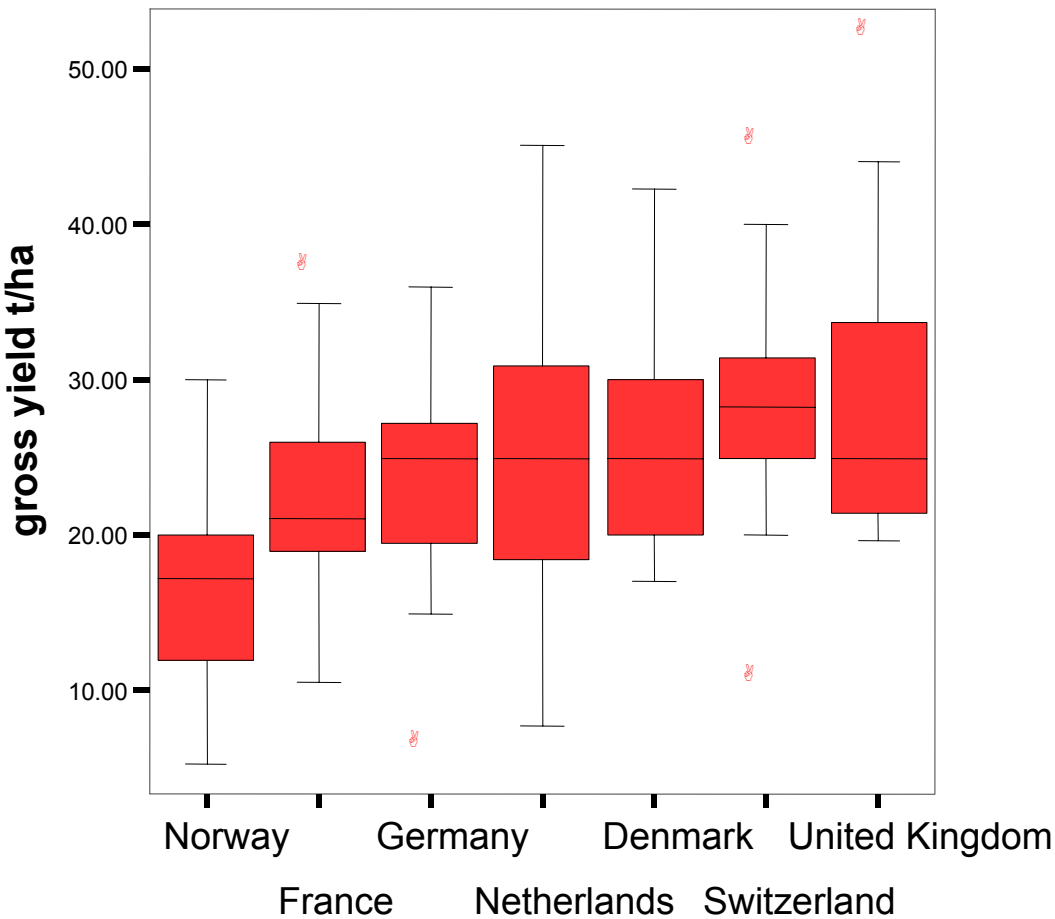
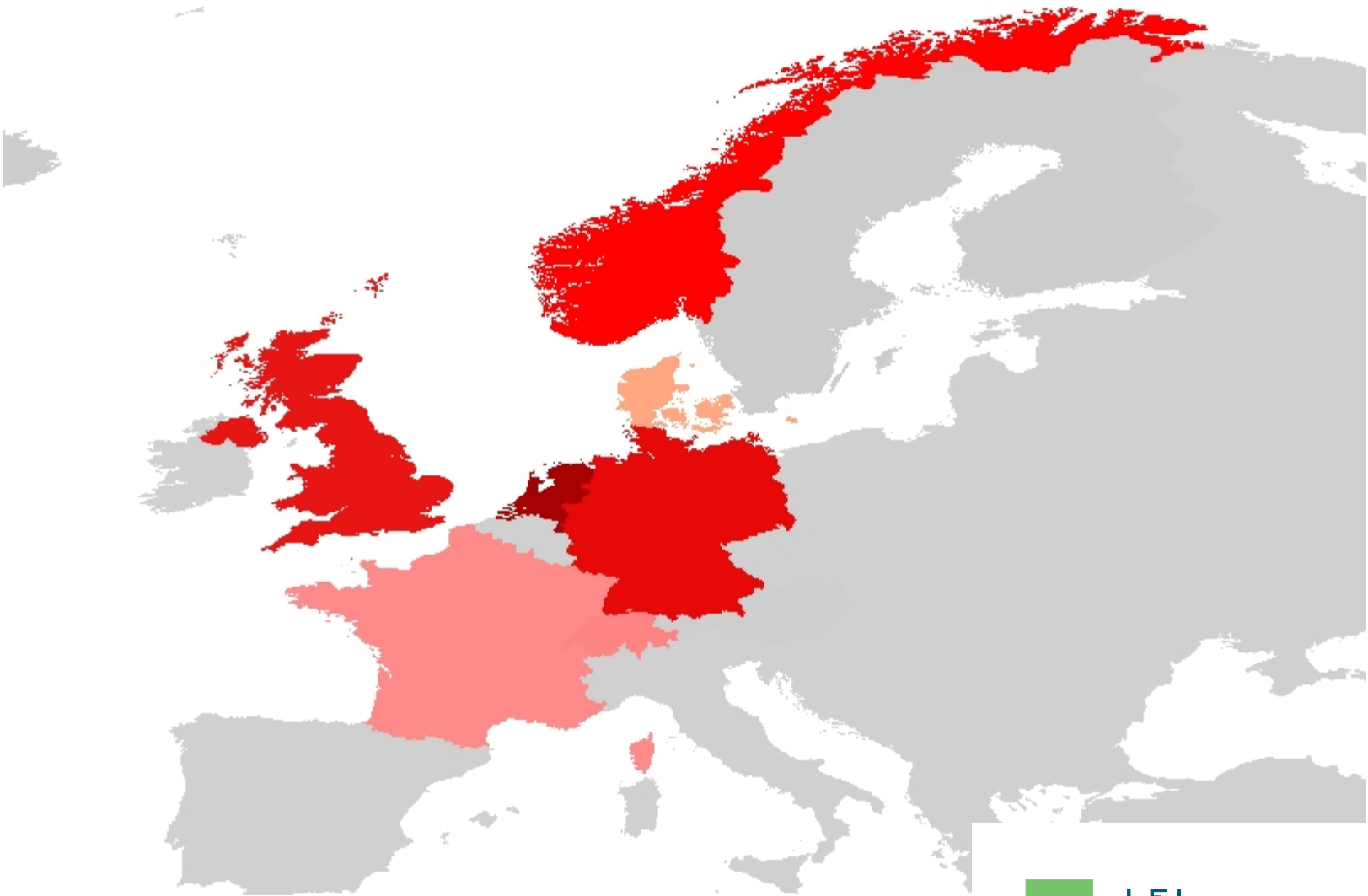
Gross yields in 2000 in 118 farms



Blight outbreaks on farms in 2000



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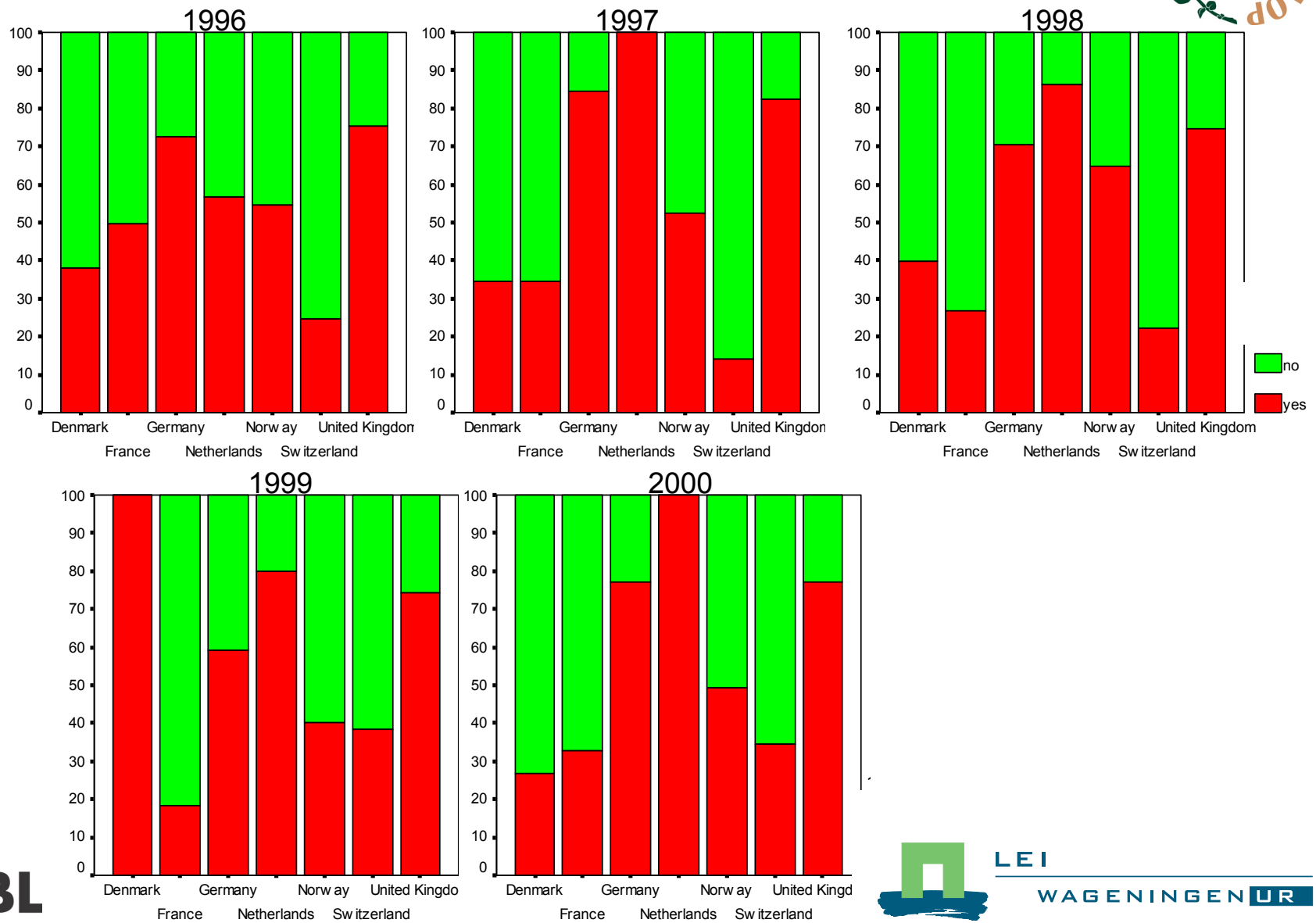
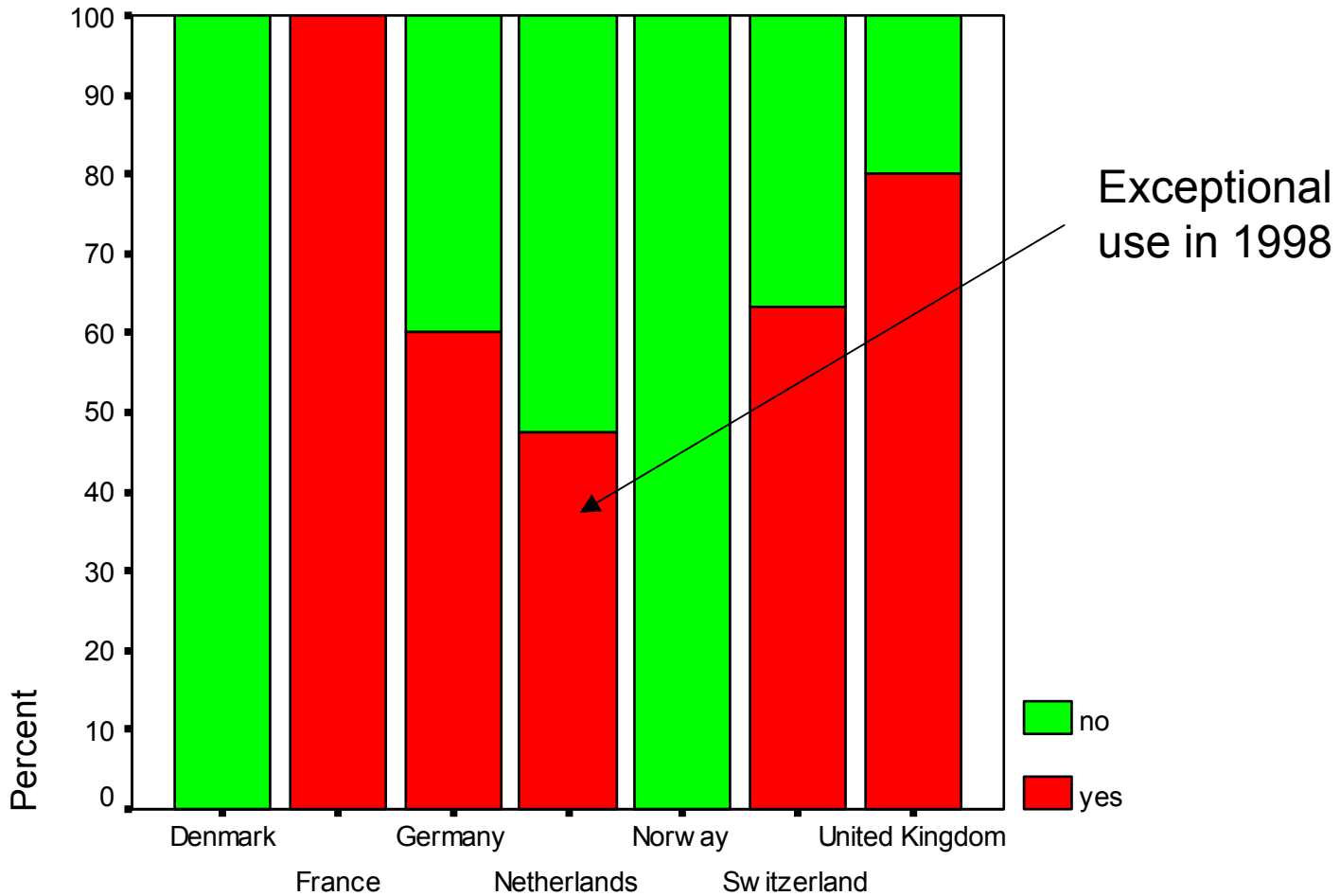
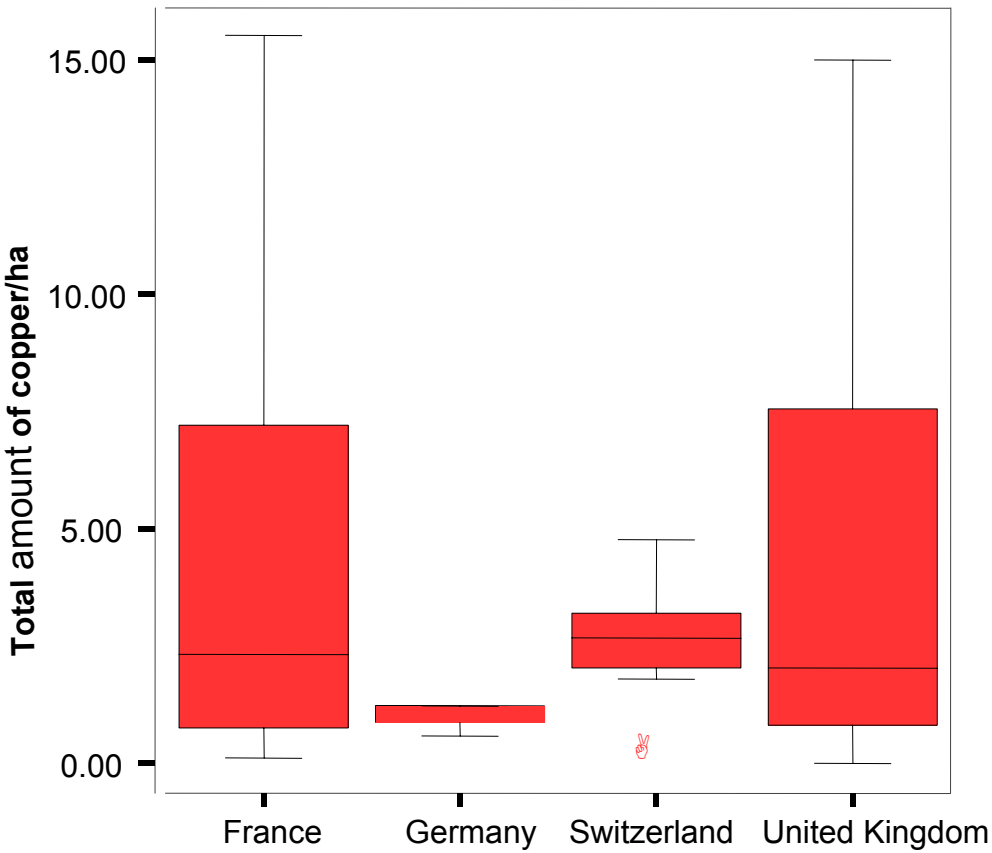
Farms with losses due to late blight



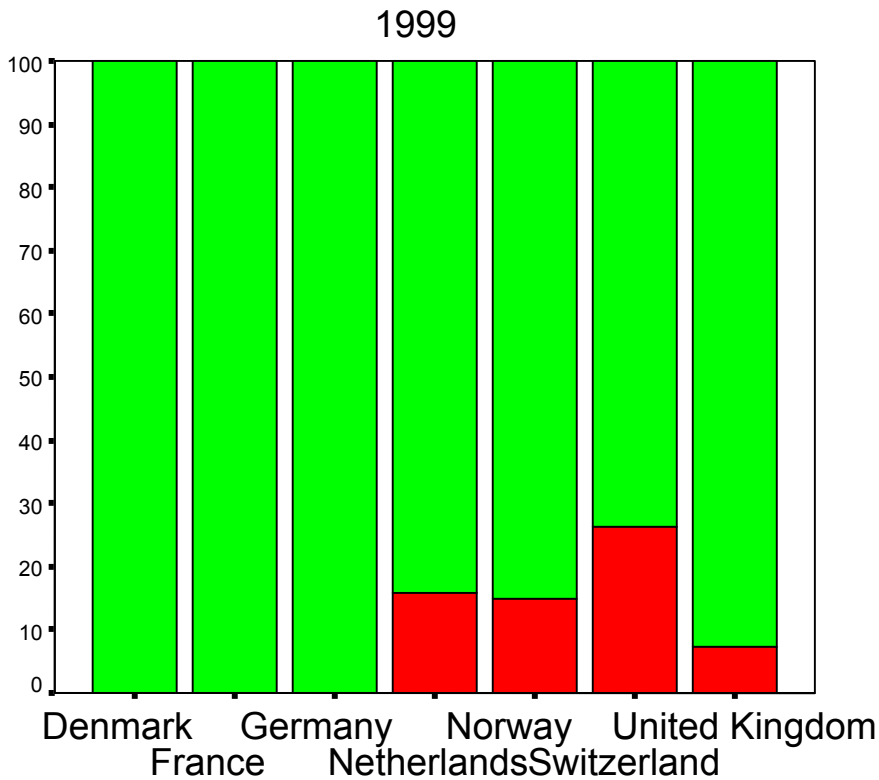
Kupfereinsatz 1996-2000 in 118 Betrieben

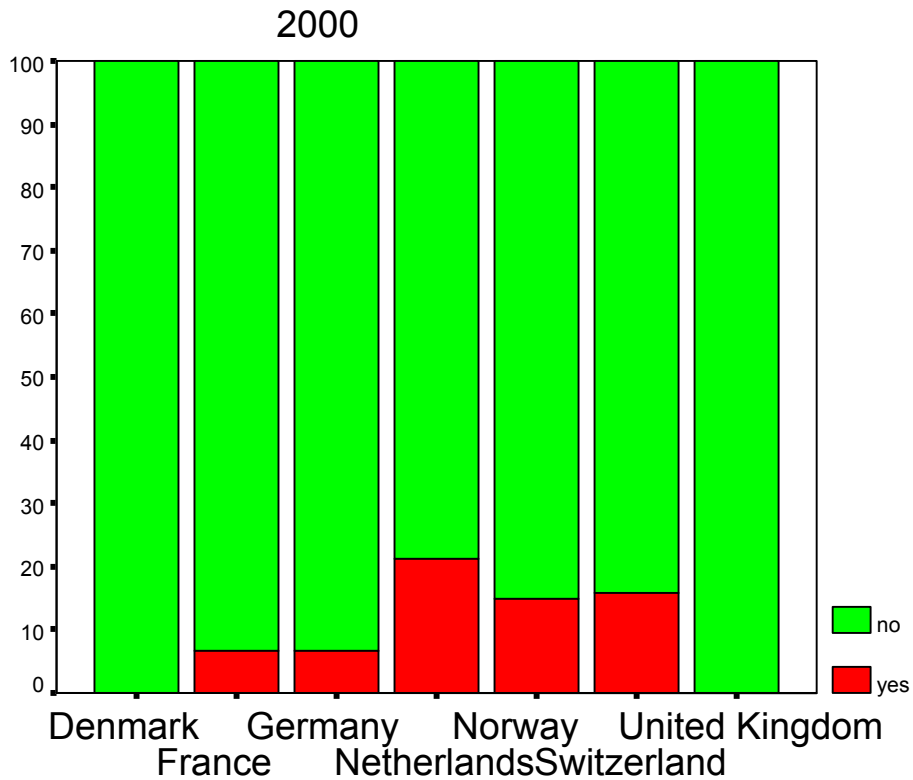


If copper used: quantity (kg/ha) in 2000?

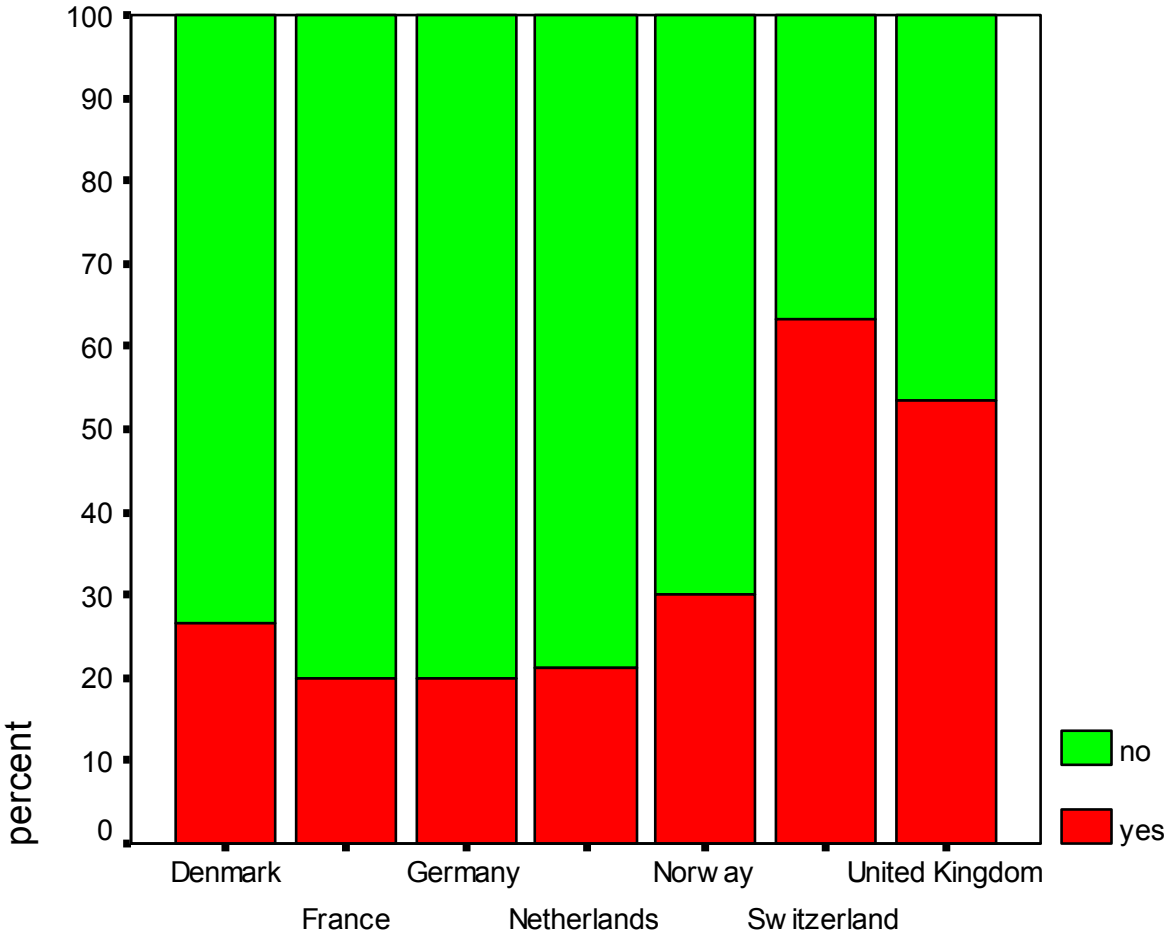


Kritik von Nachbarn wegen *P. infestans*?

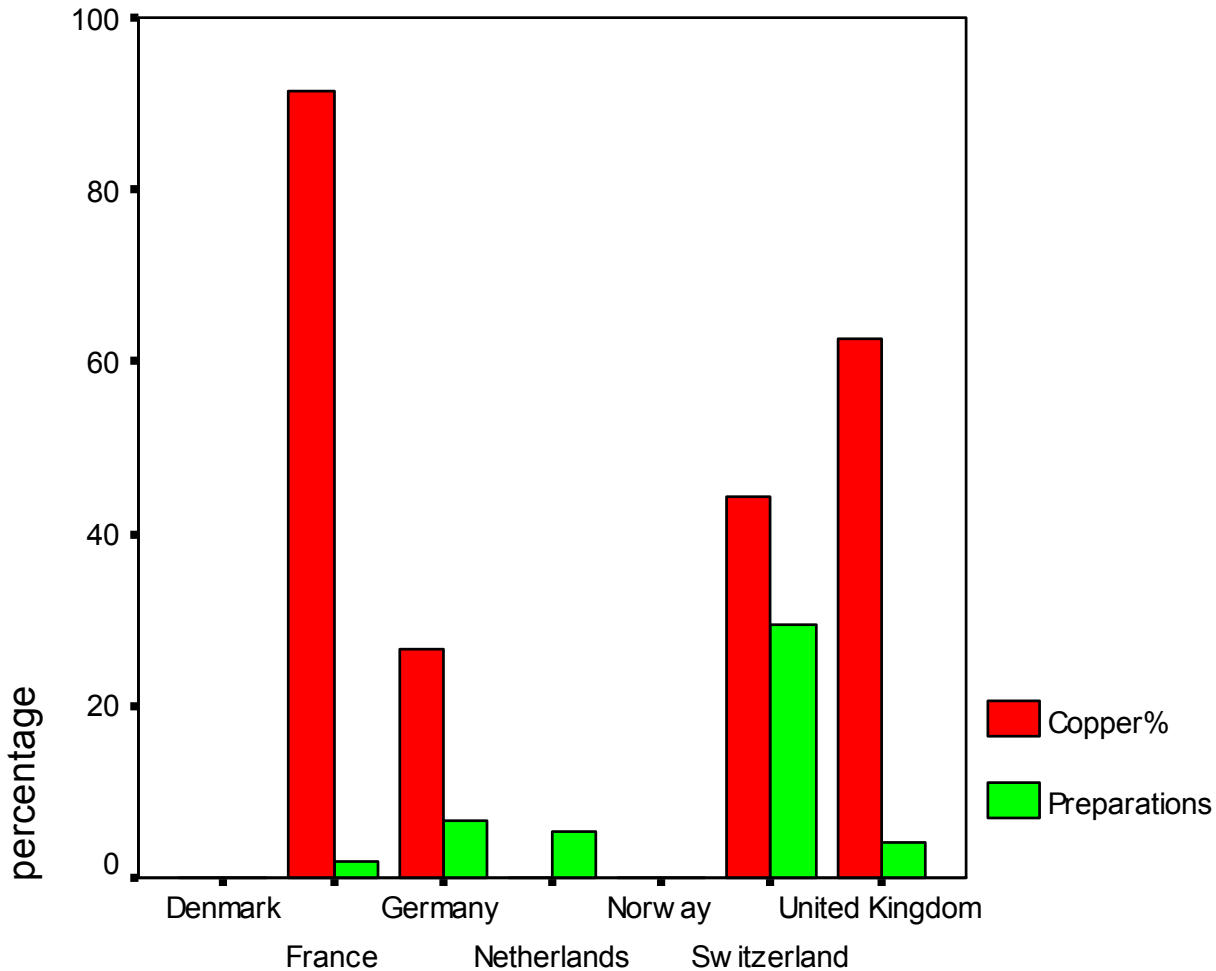




Einsatz von Alternativprodukten (118 farmers)



Falls Einsatz: geschätzter Zusatzertrag?

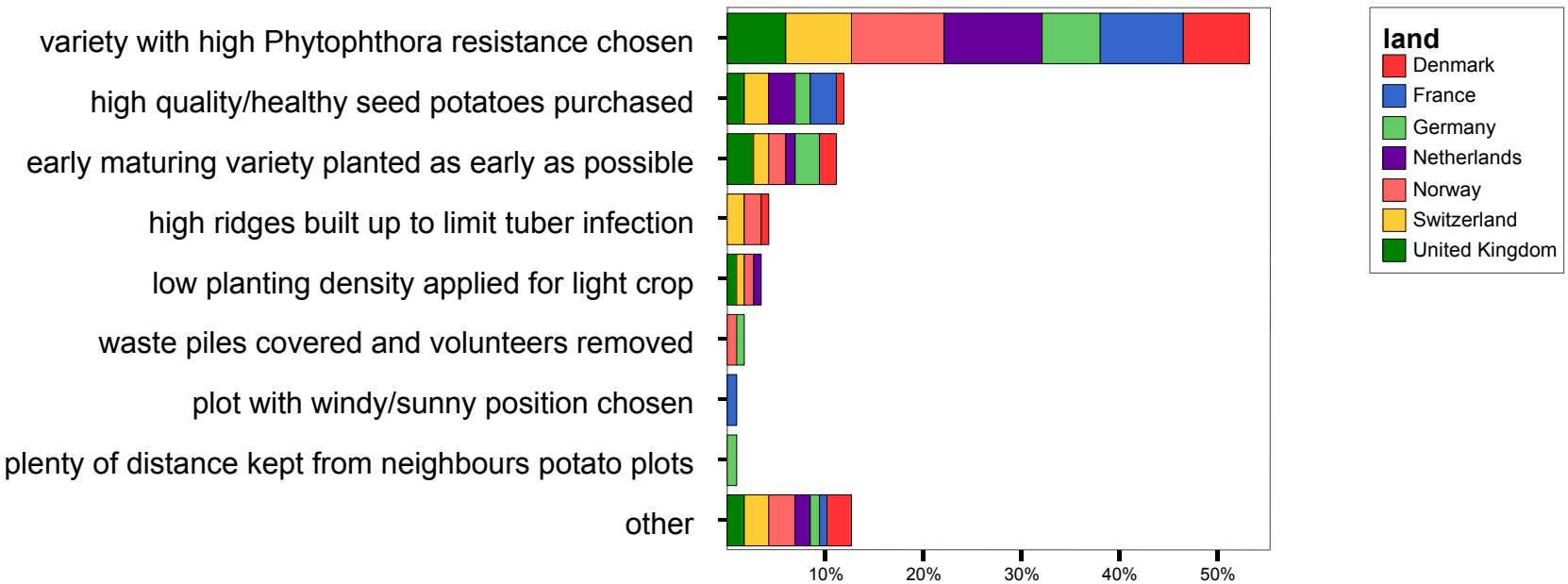


Erfolgsfaktoren (Analyse von 118 Betrieben)

	Name	variable name	Success variable 1	success variable 2
Soil fertility	v36	1.3 % animal husbandry	x	x
	v1006	soil cultivation intensity	x	x
	v1004	manuring raw strategy	x	x
	v1005bb	manuring intensity (N available total)	x	x
	v1005c	**manuring intensity (P total)**	x	x
	v1005d	**manuring intensity (K total)**	x	x
	soil	principal component for soil (v149-v153)	x	x
Seed and crop	v282	5.6 own cultivation of seed	x	x
	v287	5.9 Did chitting occur	x	x
	v385	7.4 Weed coverage	x	x
	scott1	**6.2 Planting week**	x	x
	v545	**10.1 Haulms destructed?**	x	x
	scott2	11.1 Harvest time weeknr	x	x
	v389	7.6 Irrigation	x	x
	v496	9.4 Applied extracts and preparations?	x	x
LB control	v542b	**Total amount of copper/ha**	x	x
	v542c	**number of copper sprays**	x	x
LB epidemic	v144b	distance classes	x	x
	v905	number of conventional sprays	x	x
	v906	week of first occurrence of LB	x	x
variety	v146d	varietal maturity	x	x
	var146bb	**Foliage Resistance scale 1-9**	x	x

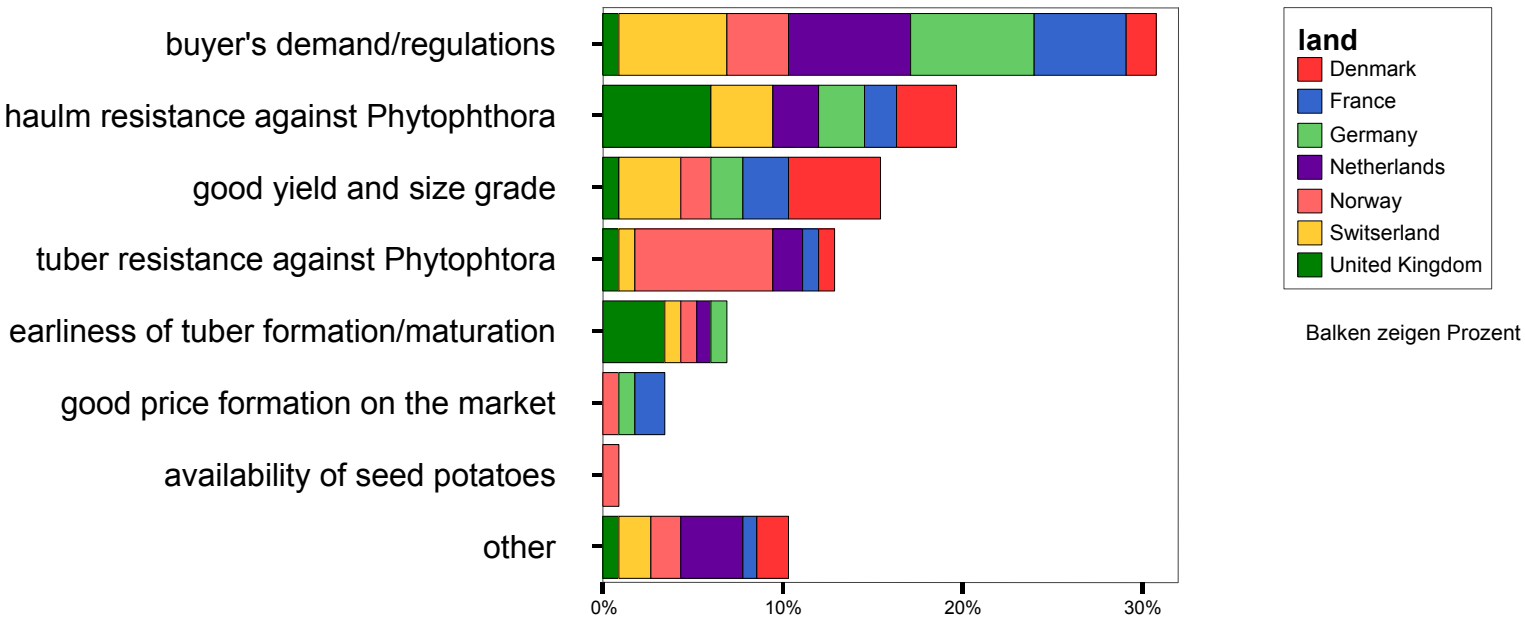
Farmers experiences & strategies II

What is your main strategy against LB?



Farmers experiences & strategies III

How do you chose the variety?



Schlussfolgerungen II

- **Bodenfruchtbarkeit (inkl. Düngung), Pflanzdatum, Sortenresistenz und direkte Kontrolle sind die wichtigsten Erfolgsfaktoren**
- **Grosse Unterschiede zwischen Betrieben (auch bei ähnlichen Standortenbedingungen)**
- **Engpässe: verbesserte Produktionstechnik und Marktakzeptanz**

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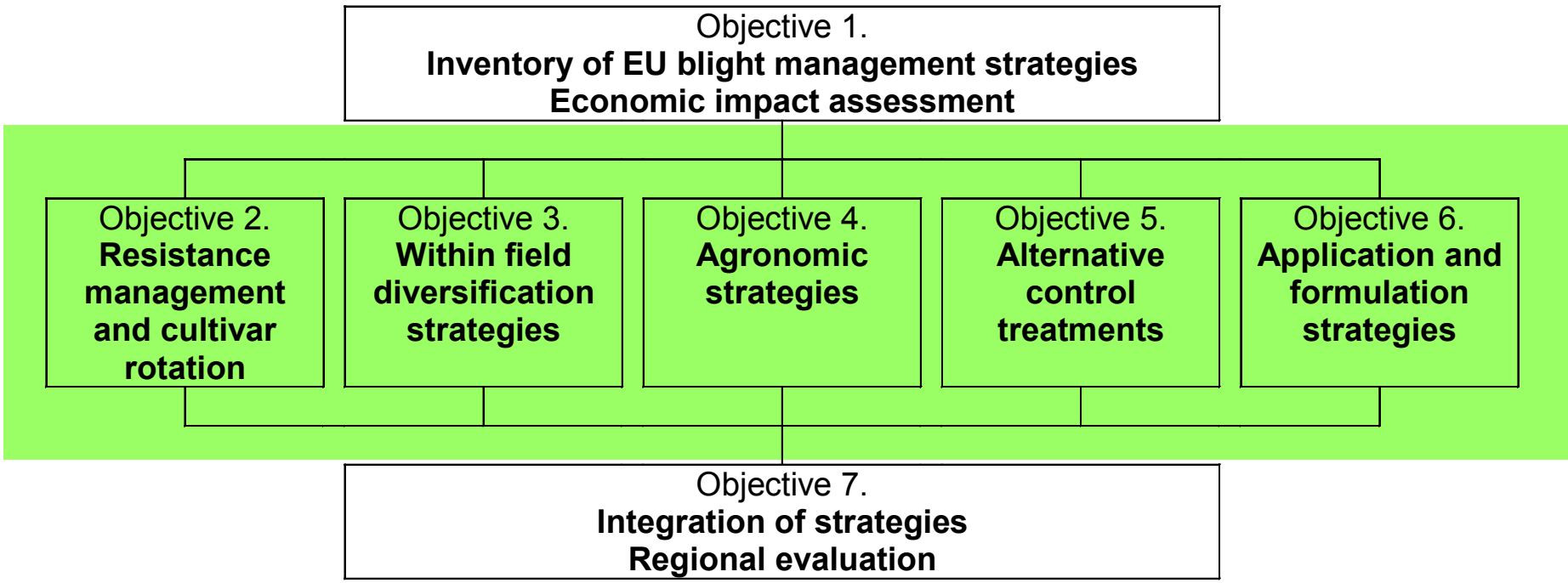
Concept of Blight - MOP



Strategie Komponenten (‚component strategies')

- Sortenresistenz
- Diversifizierung (Sortenmischung, Mischkultur)
- Agronomische Massnahmen (Pflanzzeitpunkt, Vorkeimen, Bodenbearbeitung/Fruchtbarkeit)
- Alternative Präparate
- Applikations- und Formulierungstechnik von Präparaten

Evaluation von Einzelstrategien

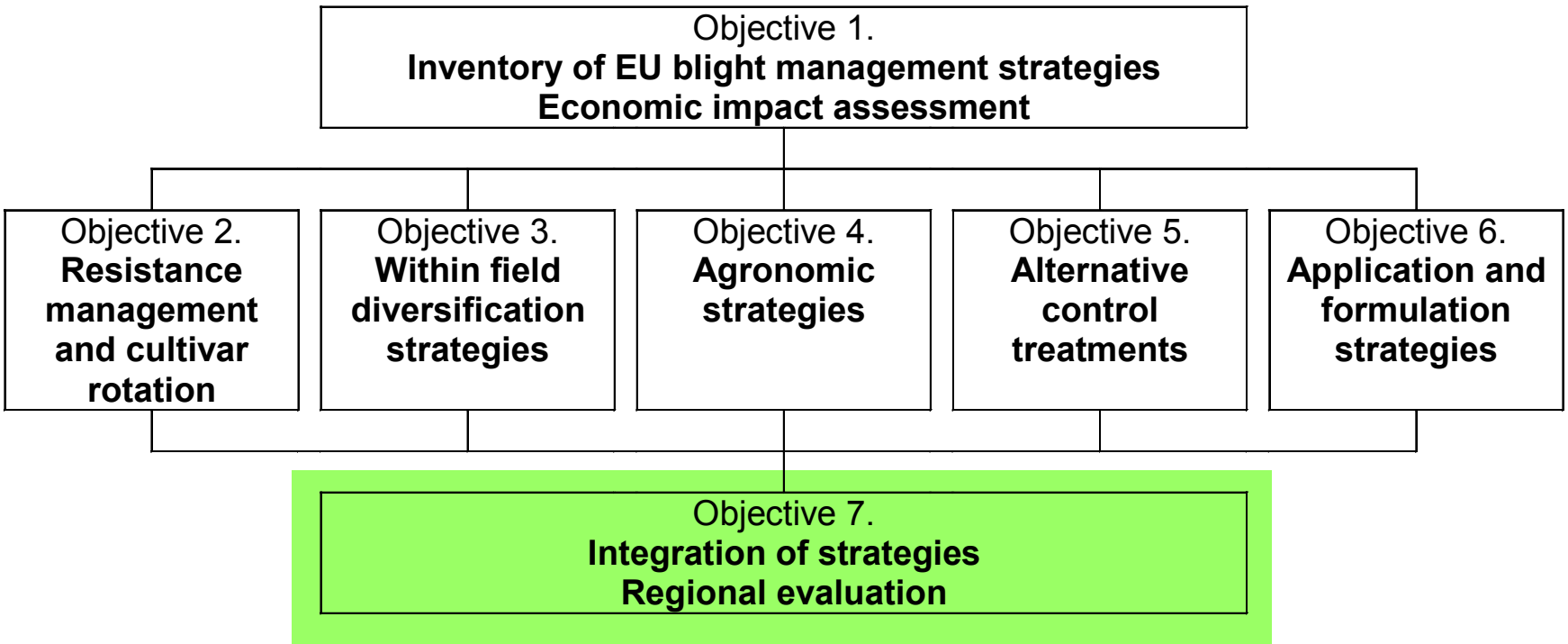
- Wirkungsgrad
- Kosten
- Riskiken
- Interaktionen mit anderen Strategien
- Machbarkeit/betriebliche Voraussetzungen
- Akzeptanz (Produzent, Konsument)
- ...

Schlussfolgerungen III

- **Wirkungsgrad und Kosten/Nutzen hängen von der Wirkungsweise der Strategie und vom Umfeld ab**

- **Auswahl der optimalen Kombination von Einzelstrategien für jeden Betrieb**

Concept of Blight - MOP



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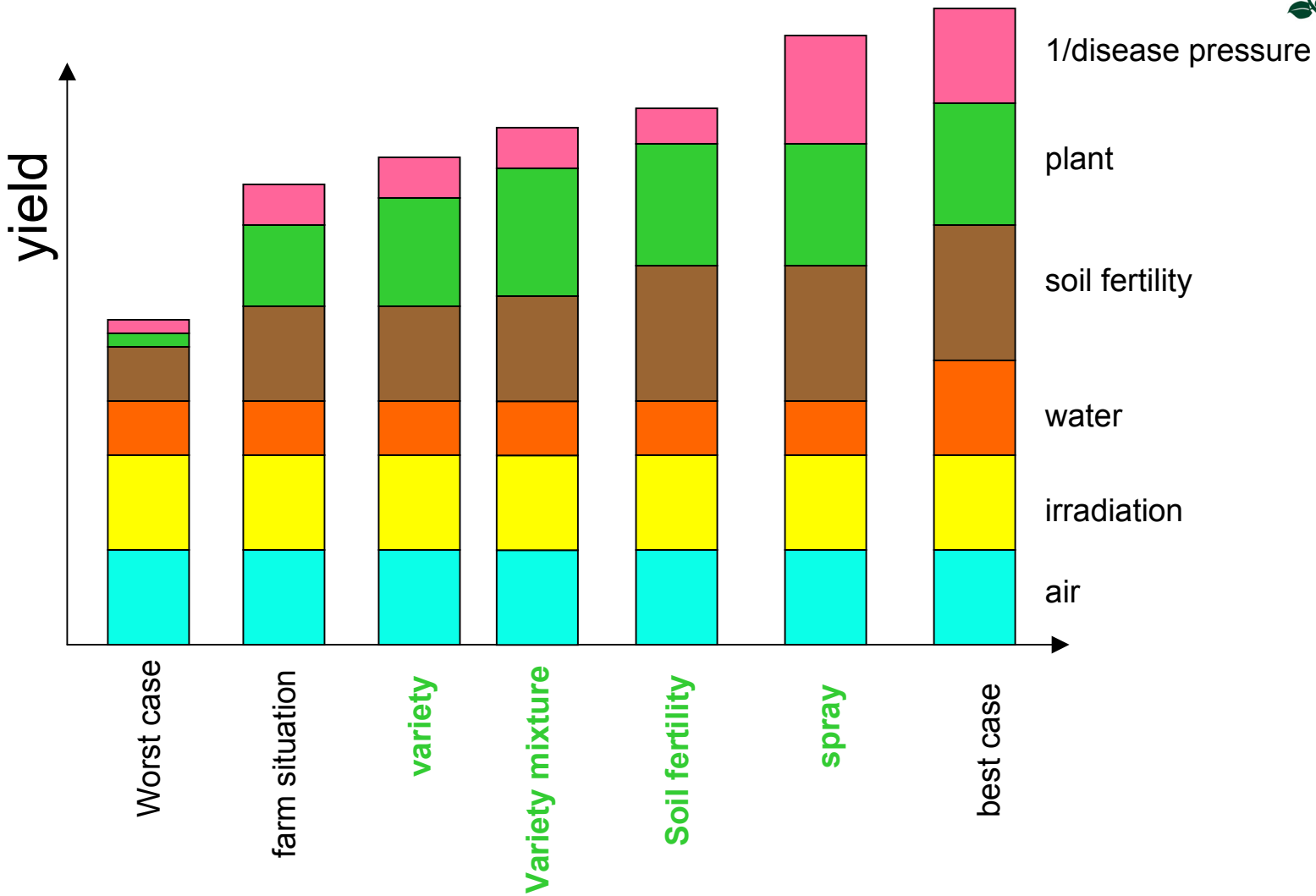
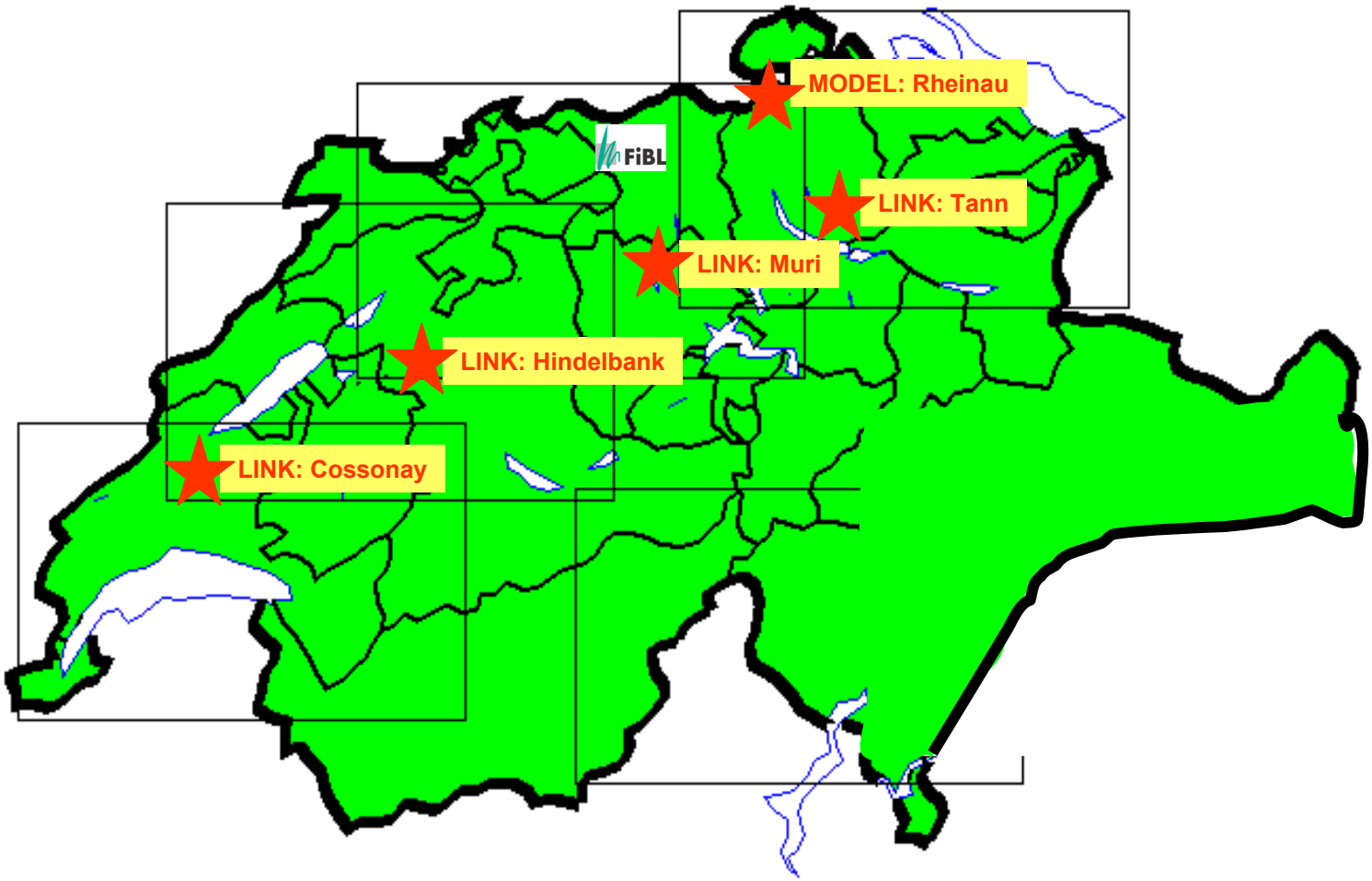
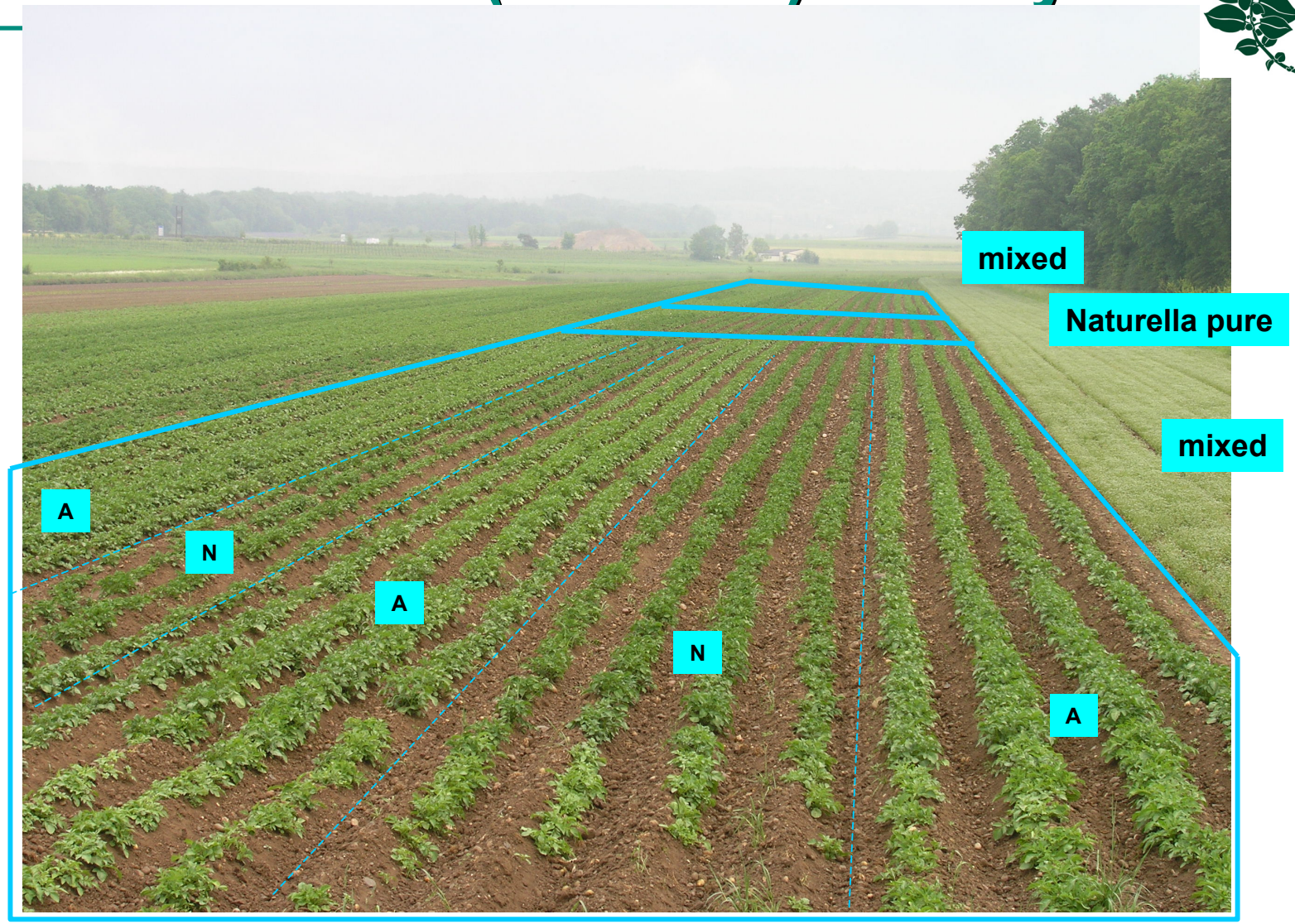
Case study: Switzerland Model farm



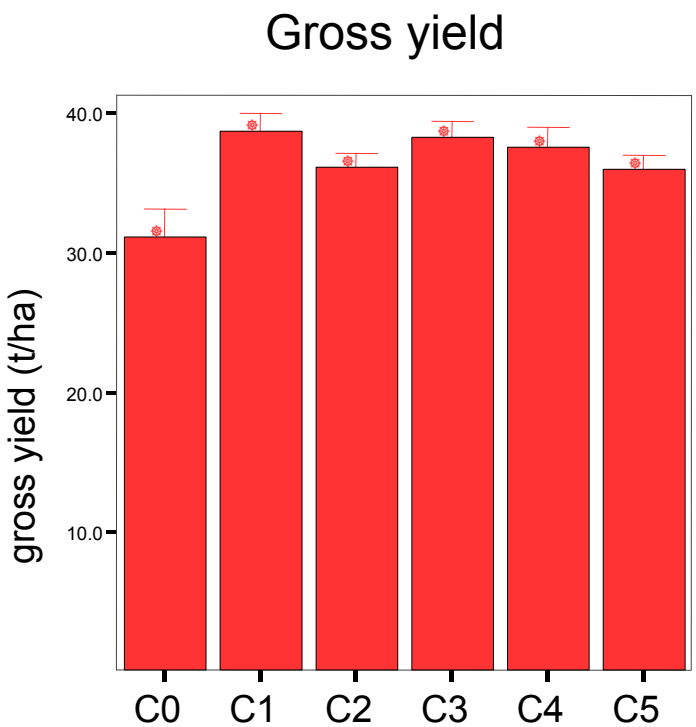
Trial sites in Switzerland

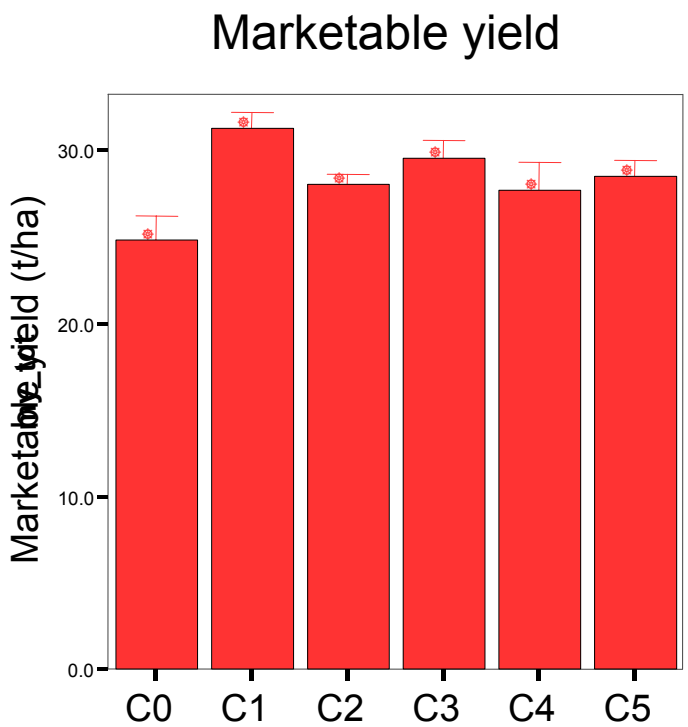


Model farm CH (Rheinau) on May 21



Model farm Switzerland: yields

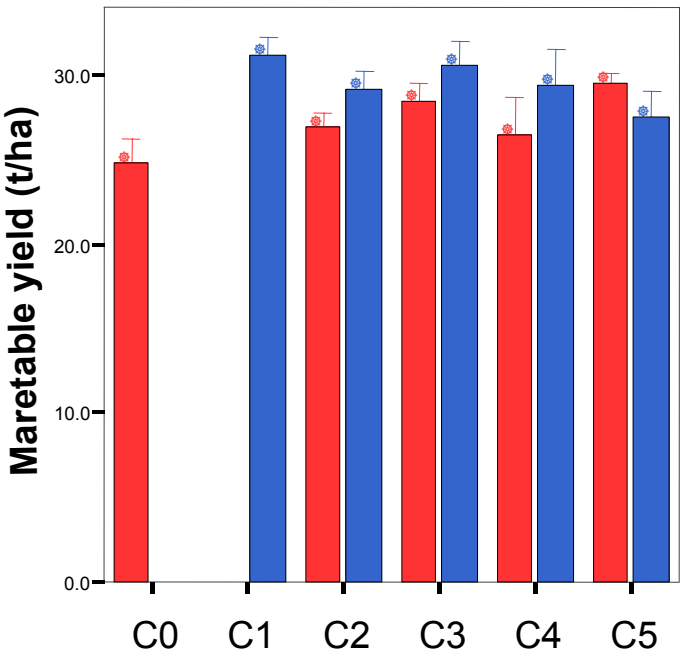




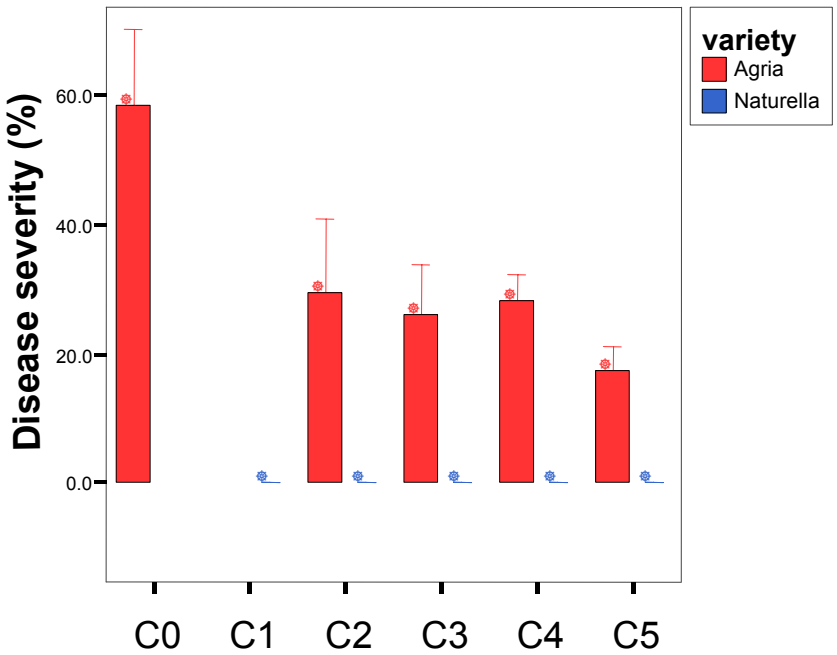
CULBMS	standard variety
CULBMS+1	resistant variety 1
CULBMS+1+2	diversification strategy
CULMBS+1+2+3	agronomic strategy 1 (soil fertility management)
CULMBS+1+2+3+4	Alternative treatments (Myco Sin) 5 applications
CULMBS+1+2+3+4+5	Application technology

Model farm Switzerland: yields & LB

Marketable yield



Late blight severity



CULBMS
CULBMS+1
CULBMS+1+2
CULMBS+1+2+3
CULMBS+1+2+3+4
CULMBS+1+2+3+4+5

standard variety
resistant variety 1
diversification strategy
agronomic strategy 1 (soil fertility management)
Alternative treatments (Myco Sin) 5 applications
Application technology

Model farm CH: Cost vs. benefit

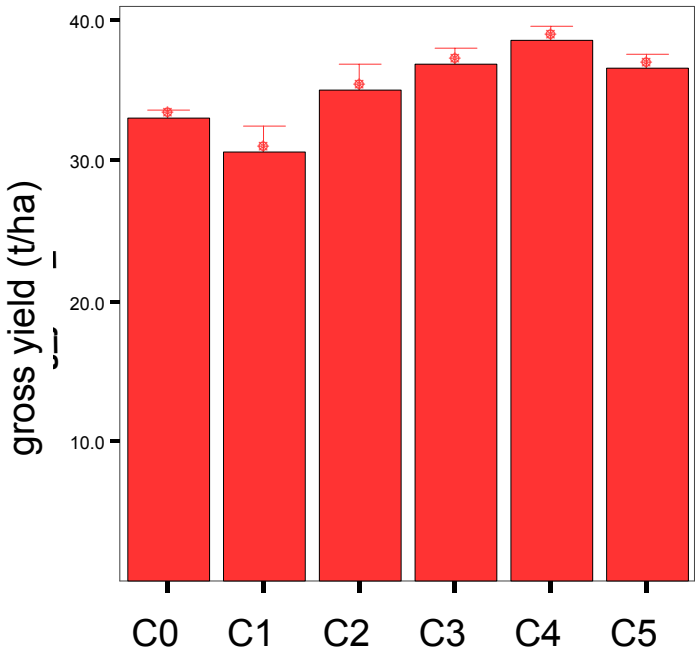
Costs	component strategy	Euro/ha	CUBLMS	CUBLMS +1	CULBMS +1+2	CULMBS +1+2+3	CULMBS +1+2+3+ 4	CULMBS +1+2+3+ 4+5
CULBMS	standard variety	2673	8'144					
CULBMS+1	resistant variety 1	2673		8'144				
CULBMS+1+2	diversification strategy	2673			8'420			
CULMBS+1+2+3	agronomic strategy 1 (soil fertility management)	177				8'592		
CULMBS+1+2+3+4	Alternative treatments (Myco Sin) 5 applications	162					9'054	
CULMBS+1+2+3+4+5	Application technology	162						9'879

Yield								
CULBMS	standard variety	14'861	14'861					
CULBMS+1	resistant variety 1	18'726		18'726				
CULBMS+1+2	diversification strategy	16'794			16'794			
CULMBS+1+2+3	agronomic strategy 1 (soil fertility management)	17'706				17'706		
CULMBS+1+2+3+4	Alternative treatments (Myco Sin) 5 applications	16'629					16'629	
CULMBS+1+2+3+4+5	Application technology	17'116						17'116

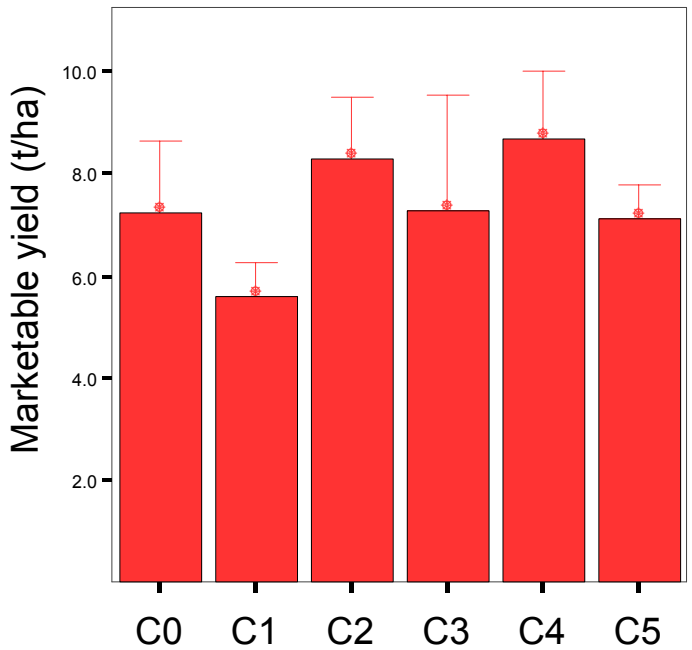
yield-costs	**6'718**	**10'583**	**8'375**	**9'114**	**7'575**	**7'237**
extra yield-extra costs	**0**	**3'865**	**1'657**	**2'397**	**857**	**519**

Model Farm NL

Gross yield



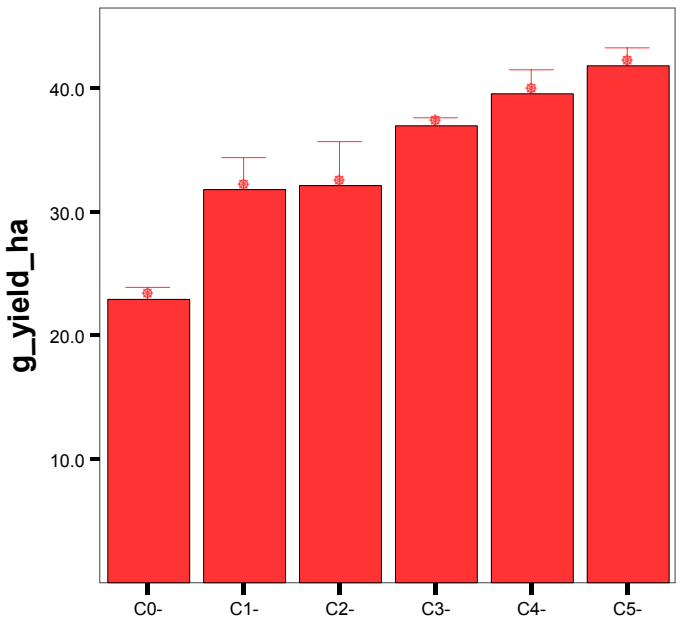
Marketable yield



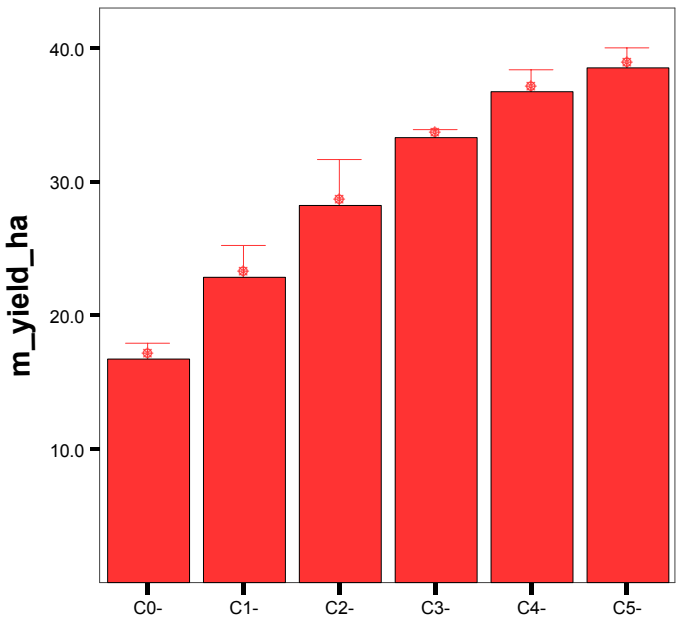
CULBMS	standard variety
CULBMS+1	organic Fertilizer after ridge formation
CULBMS+1+2	compost
CULMBS+1+2+3	chitting
CULMBS+1+2+3+4	plant density reduced
CULMBS+1+2+3+4+5	plant strengthener

Model farm UK

Gross yield



Marketable yield



CULBMS	standard variety
CULBMS+1	Resistant variety
CULBMS+1+2	chitting
CULMBS+1+2+3	Early defoliation
CULMBS+1+2+3+4	compost
CULMBS+1+2+3+4+5	plant strengthener

LINK farm experiments: e.g.Tann, CH

CULBMS variety Désirée

CULBMS improved Variety mixture (Désirée / Appell) Myco-Sin spraying

Preliminary results of Link Farms

Country	Farm	integrated strategy	Marketable yield difference	Remarks
UK	Link farm 1	Resistant variety + chitting + fertility management	80%	
	Link farm 2	Resistant variety + chitting + fertility management	25%	
	Link farm 3	Resistant variety + chitting + fertility management	100%	
	Link farm 4	Resistant variety + chitting + fertility management	80%	
Switzerland	Link farm 1	Variety mixture + leaf fertilizer, no copper	20%	
	Link farm 2	Variety mixture + plant strengthener	25%	
	Link farm 3	Resistant variety	-5%	no more copper
	Link farm 4	Variety mixture + BCA against Rhizoctonia	-10%	no late blight
Netherlands	Link farm 1	other precrop + improved fertility input	5%	
	Link farm 2	intercropping with flowering mixture	0%	
	Link farm 3	other precrop, pre-planting fertilisation, after planting fertilisation	100%	
	Link farm 4	other precrop + compost	-90%	
Denmark	Link farm 1			
	Link farm 2			
	Link farm 3			
	Link farm 4			
Norway	Link farm 1			
	Link farm 2			
	Link farm 3			
	Link farm 4			
Germany	Link farm 1			
	Link farm 2			
	Link farm 3			
	Link farm 4			

Schlussfolgerungen IV

- Wir haben im Jahr 2004 auf 35 Betrieben in 7 Ländern Alternativstratgeien vorgeschlagen und evaluiert
- Die vorläufige zeigt, dass in vielen Fällen substanzielle Ertragssteigerungen möglich sind (bis zu 20 t/ha marktfähiger Ertrag/ha)
- Kupfer-freier biologischer Kartoffelanbau ist möglich und auch wirtschaftlich in optimierten Systemen

Verdankungen

- 118 farmers (survey)
- 35 farmers (Link and Model farm experiments)
- 20-30 collegues in 13 partner institutions in Blight MOP
- EU and national sponsors

References:

www.fibl.org

www.orgprints.org/2936/