

GLYPHOSATE BAN IN THE EU – HOW DO OTHER COUNTRIES REACT?

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WHY SO MUCH CONCERN ABOUT GLYPHOSATE?

- Glyphosate is the most frequently used herbicide in the EU
- Glyphosate is a unique herbicide, that cannot be replaced by any single herbicide or any non-chemical measure
- Changes in farming practice (crop rotation, minimum tillage) in the EU in the last decades have relied on the use of glyphosate

Key properties

Wide weed spectrum

Effective on perennial weeds

Wide application window

Used for substitution of banned herbicides

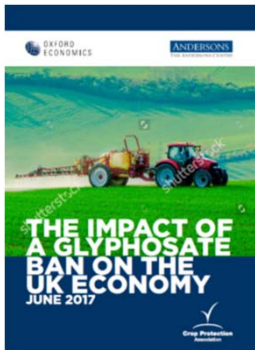
Important tool to combat resistance problems ('resistance breaker')

AUTHORIZED USES IN EUROPE

Usage situation by country	Belarus	Belgium and Luxembourg	Bulgaria	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Kazakhstan	Netherland	Norway	Poland	Portugal	Romania	Russia	Slovakia	Spain	Sweden	Switzerland	Turkey	UK	Ukraine
Pre-plant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Pre-emergence / Post plant	Y	Y	Y		Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y			Y	Y		Y	Y
Pre-Harvest (cereals / other crops)	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y		Y	Y	Y	Y		Y	Y	Y		Y			Y	Y
Harvest aid / Desiccation	Y	Y	Y	Y	Y			Y		Y	Y		Y	Y	Y	Y		Y	Y		Y	Y			Y	Y
Post-Harvest / Stubble	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y
Vines / Orchards / Olives	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Grassland renewal	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y
Set-aside		Y				Y	Y	Y		Y	Y	Y		Y		Y	Y	Y				Y	Y	Y	Y	Y
Forestry / Christmas tree	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y
Crop inter-row		Y				Y	Y	Y	Y			Y		Y			Y	Y				Y		Y		Y
Railway / Amenity / Non crop use	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Aquatic use / Water ditches	Y			Y					Y		Y		Y						Y	Y	Y				Y	Y

<https://monsanto.com/app/uploads/2017/06/agronomic-benefits-of-glyphosate-in-europe.com>

REPORTS



UK



Impact of a glyphosate ban on the UK economy.

Oxford Economics and the Anderson's Centre (2017).

Prepared for Crop Protection Association.



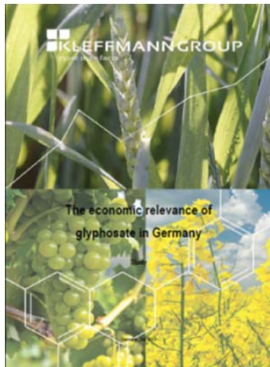
France



Reboud X. et al, 2017. *Usages et alternatives au glyphosate dans l'agriculture française.* Reponse Inra à la saisine Ref TR507024.

Executive summary in English: ***Glyphosate use and alternatives in French agriculture.*** INRA

REPORTS



Germany



Kehlenbeck H. et al., 2015: ***Impact assessment of partial or complete abandonment of glyphosate application for farmers in Germany.*** Julius Kühn Archiv, no 451, Braunschweig

Schulte et al., 2016: ***The economical impact of glyphosate on German farming.*** Göttingen University.

Fairclough B., Mal P. & Kersting S. (2017): ***The economic relevance of glyphosate in Germany.*** Edited by Kersting S., Kleffman Group. Prepared for 'Task Force Glyphosate'

DIE ÖKONOMISCHE BEWERTUNG VON GLYPHOSAT IM DEUTSCHEN ACKERBAU

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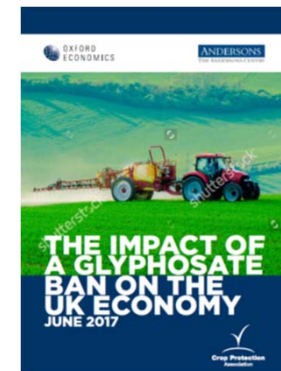
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D-37073 Göttingen
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2016

Vortrag anlässlich der 96. Jahrestagung der GEWISOLA
„Agrar- und Ernährungswirtschaft: Regional vernetzt und global erfolgreich“
Bonn, 28. bis 30. September 2016



IMPACT ON FARM ECONOMY



The current situation ('pre-ban') is compared with a 'post-ban' scenario taking into account the cost of insufficient weed control

Farm scale & UK economy

Assumptions:

1-3 extra cultivations

1-2 extra herbicide treatment

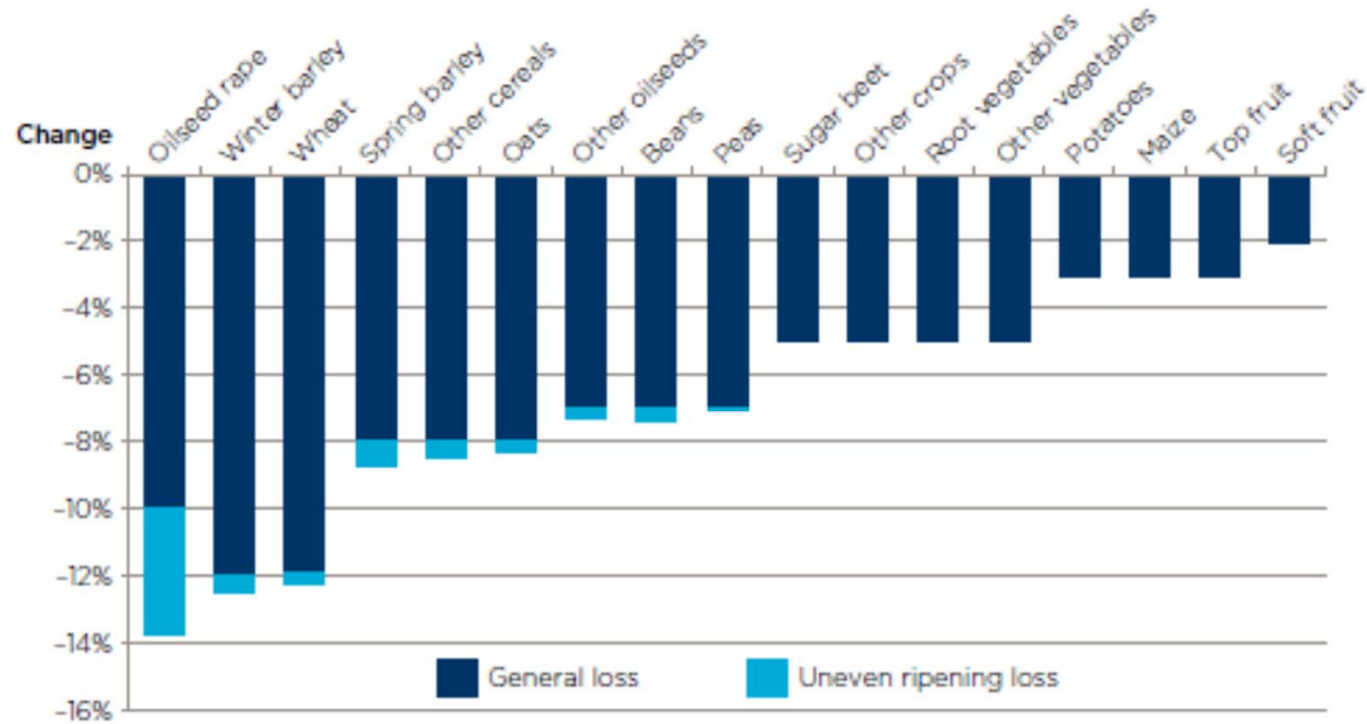
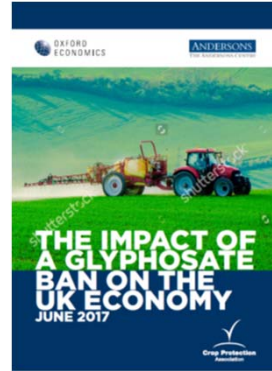
Yield loss due to uneven ripening

Yield loss due to increased weed contamination

Reduced crop quality



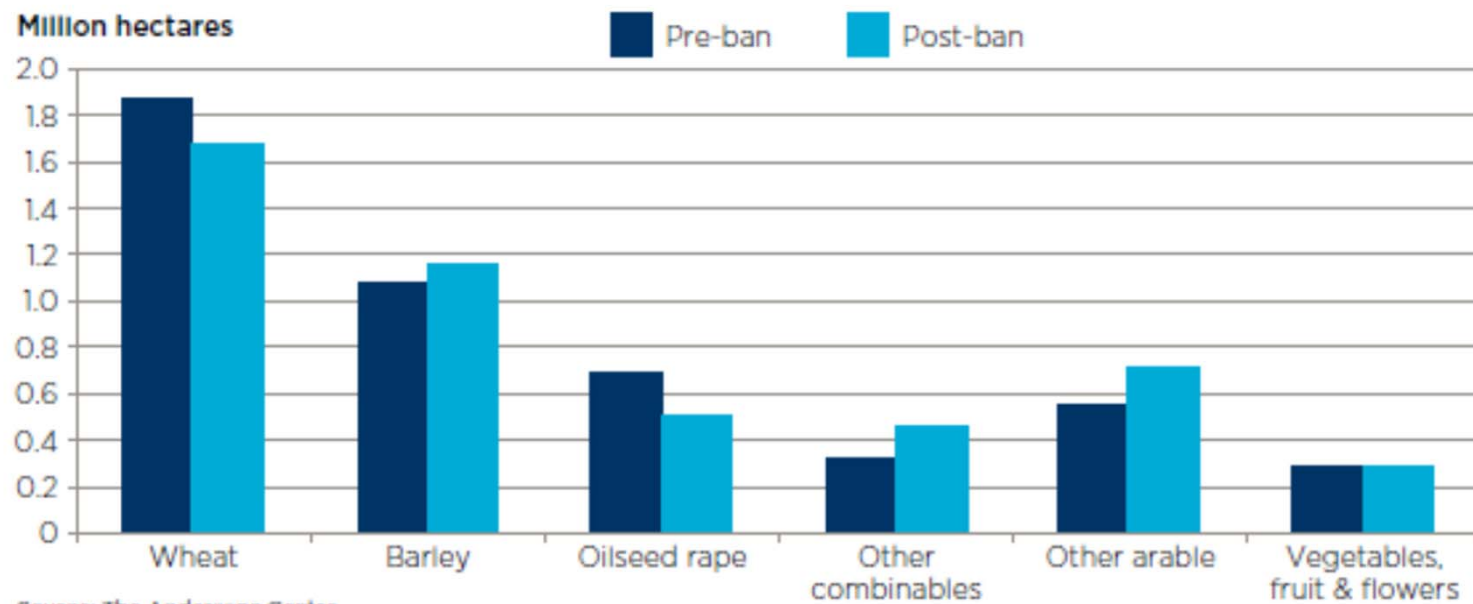
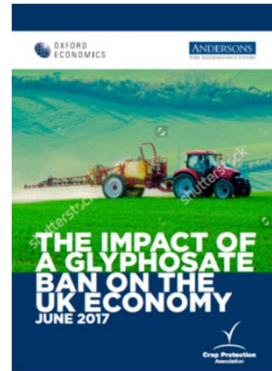
ESTIMATED CHANGES IN YIELD



Source: The Andersons Centre



ESTIMATED CHANGE IN CROP AREAS

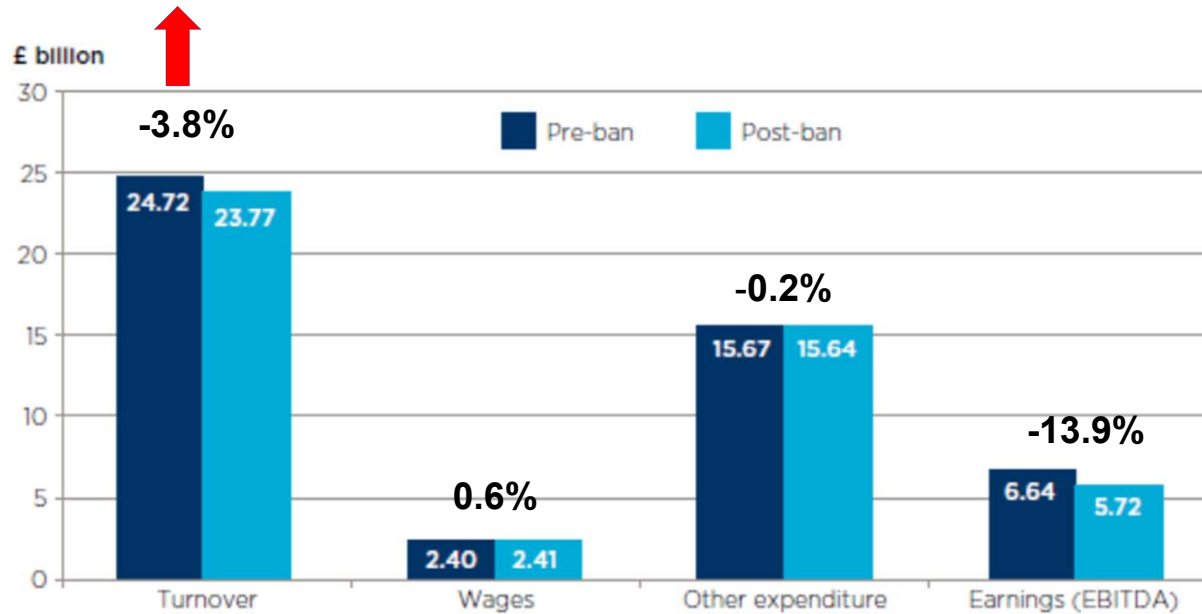


Source: The Andersons Centre

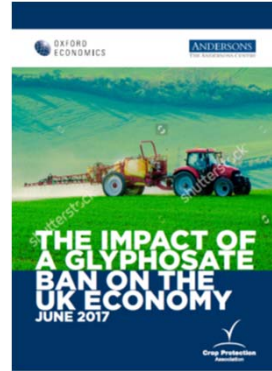


IMPACT ON UK ECONOMY

940 mill. £
≈ 160 mio.£ ha⁻¹ (2000 SEK/ha)

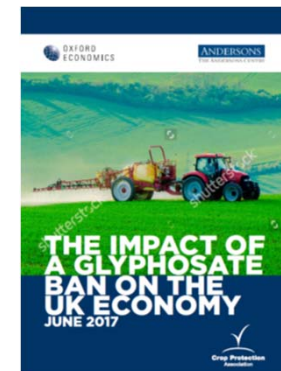


Source: The Andersons Centre



MAIN CONCLUSIONS

- No chemical substitute
- Increase of inverse tillage and mechanical cultivation (1-3 treatments)
- Increased number of applications of selective herbicides
- Changes in crop choices (more spring cropping)
- Yield reductions and lower grain quality
- 14% reduction in profit margin per hectar ($\approx 2000 \text{ SEK ha}^{-1}$)





CURRENT RESTRICTIONS

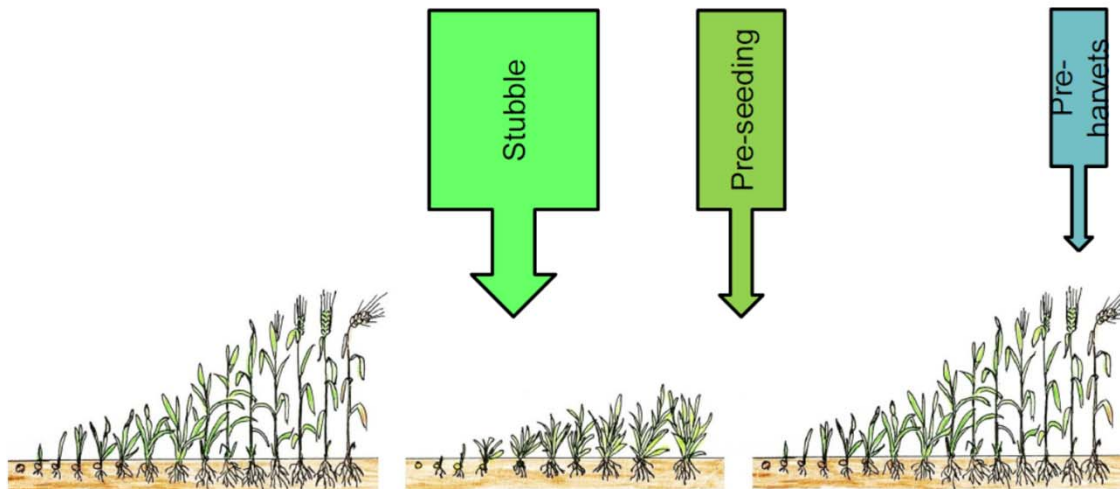
- Maximum two treatments per year
- Minimum 90 days between treatments
- Maximum 3.6 kg/ha glyphosate per year
- Pre-harvest only as spot treatments

Annual consumption: 5.000 t glyphosate

CONSUMPTION IN GERMANY

Uses in agricultural crops (37 % of the area is treated)

Stubble	60% consumption on 20% of area
Pre-sowing	21% consumption on 13 % of area
Pre-harvest	11% consumption on 4 % of area



Zwinger Institut für Pflanzenschutz in Ackerbau und Grünland



JKI STUDY

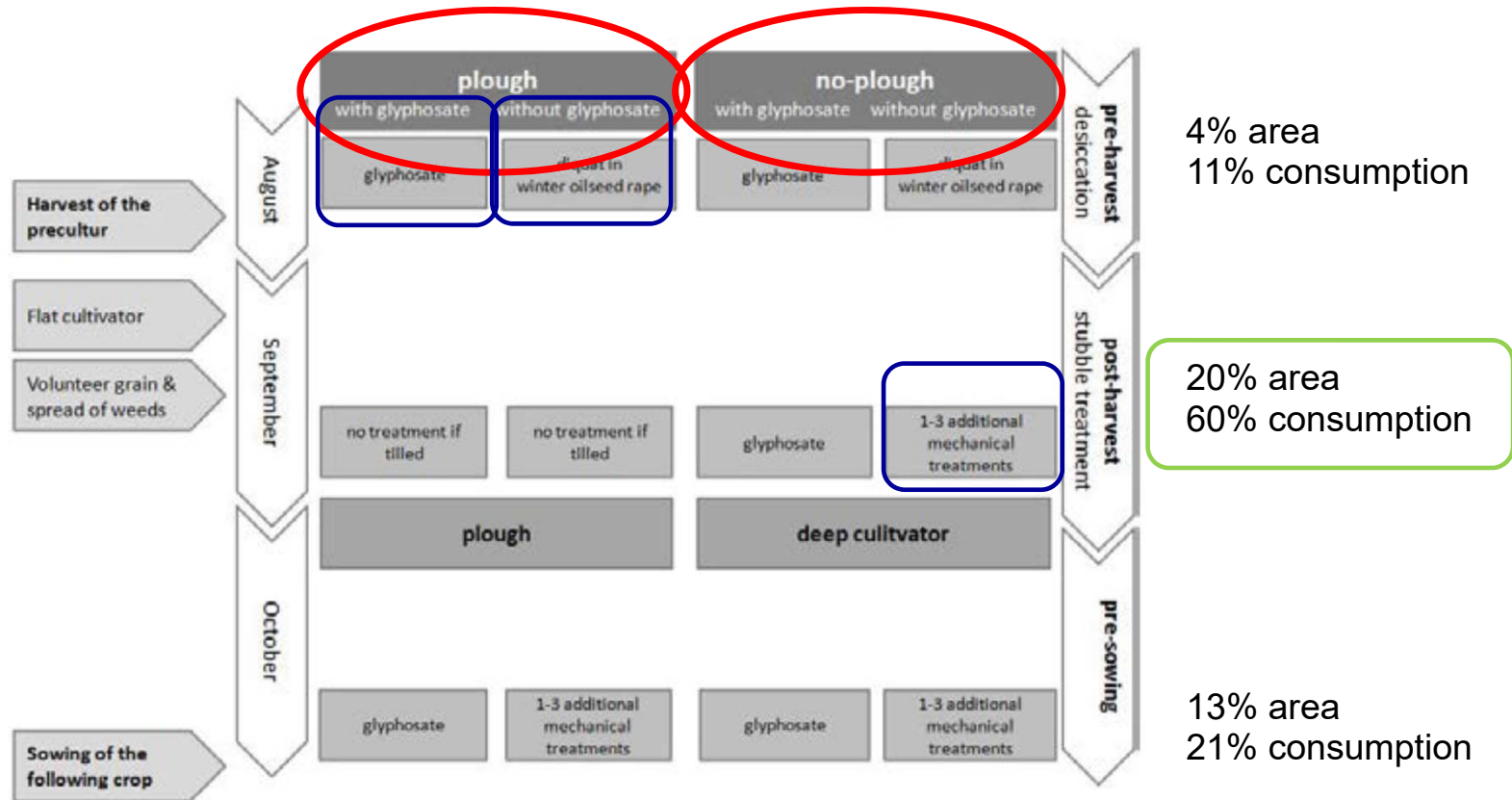


Consequences at **farm scale**. Five different crop rotations

- WOSR - winter wheat - winter wheat
 - Corn - winter wheat - winter wheat
 - WOSR - winter wheat - winter barley
- } Pre-harvest + pre-sowing
} Stubble
} Pre-sowing
- Corn - winter wheat - spring barley
 - WOSR - winter wheat - spring barley
- } Pre-harvest + pre-sowing,
} Pre-harvest + pre-sowing + stubble
} Stubble + pre-sowing



SCENARIOS





ASSUMPTIONS

- 0-5 % lower yield in no-till compared to ploughing
- 0-5 % lower yield with loss of glyphosate
- Glyphosate can be substituted by 1-3 mechanical treatments
- All scenarios estimated for "no need for drying seeds" and "drying required"
- Less yield reduction for loss of glyphosate in pre-harvest scenarios where 'no drying required' and yield gain of 0 to 5% for chemical desiccation (diquat)





COST IN DIFFERENT CROP ROTATIONS



Crop rotation	Treatment	Grain drying required		No grain drying	
		Plough	No plough	Plough	No plough
Winter crop rotation	Pre-harvest+ pre-sowing	Red	Red	Yellow	Yellow
	Stubble	Green	Yellow	Green	Yellow
	Pre-sowing	Yellow	Yellow	Yellow	Yellow
Spring crop rotation	Pre-harvest + pre-sowing	Red	Red	Yellow	Yellow
	Pre-harvest + stubble + pre-sowing	Red	Red	Yellow	Red
	Stubble + pre-sowing	Yellow	Yellow	Yellow	Yellow

Reduction in profit margin of glyphosate ban: ■ None ■ < 430 SEK ha⁻¹ ■ More than 430 SEK/ha



CONCLUSIONS

Stubble and pre-sowing

No chemical alternatives to glyphosate

1-3 mechanical treatments can substitute for glyphosate under favourable conditions

More inversion tillage → increased erosion

Loss of a 'resistance breaker'

Not necessarily negative economical consequences. It depends on location, weather, capacity and cropping practice

Under unfavourable conditions a reduction in profit margin of 6-17% ($\approx 320-1450 \text{ SEK ha}^{-1}$)
– similar estimates from Göttingen University

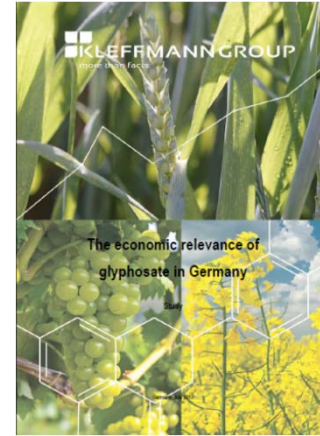
Pre-harvest

No alternatives in cereals, diquat can replace glyphosate in OSR (banned from 2020)





KLEFFMAN GROUP



Carried out for "Task Force Glyphosat" (www.glyphosat.de)

Two 'post-ban' scenarios:

- Scenario 1: Increasing costs (fuel, labour, alternative herbicides etc.).

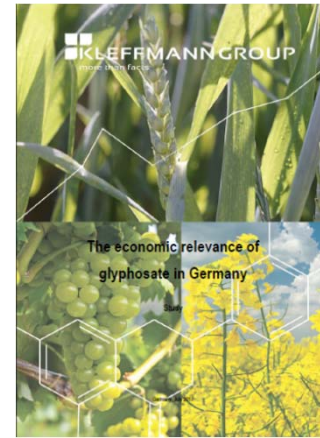
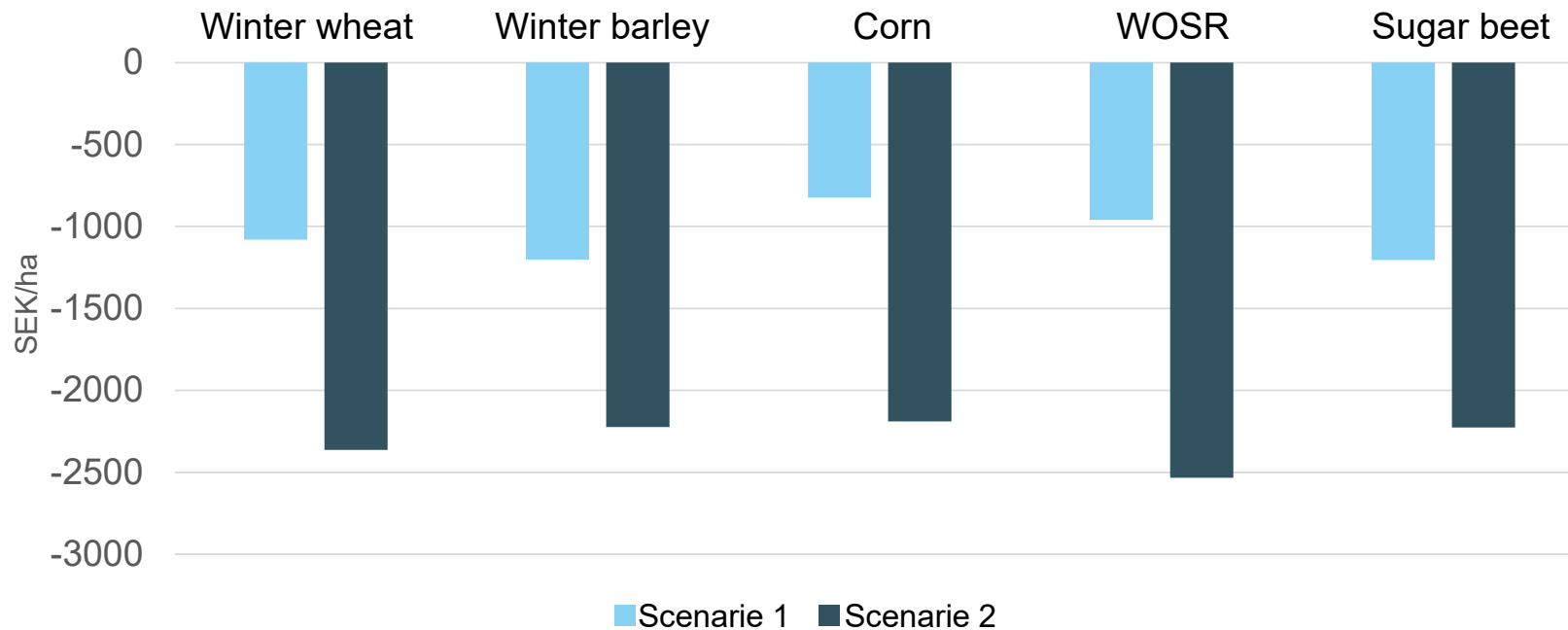
Two treatments with selective herbicides + one extra soil cultivation

- Scenario 2: Scenario 1 + yield loss

10% in wheat, barley, corn and WOSR, 5% in sugar beet



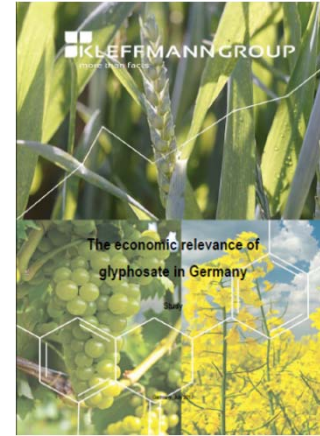
REDUCTION IN PROFIT MARGIN

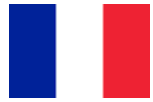




CONSEQUENCES OF BAN

- More soil cultivation
- More applications of selective herbicides (availability, effectivity?)
- Increased time and labour consumption for weed control
- Increased fuel consumption
- Increased CO₂ emission
- Increased soil erosion
- Profit margins reduced with 800-2500 SEK ha⁻¹





INRA REPORT

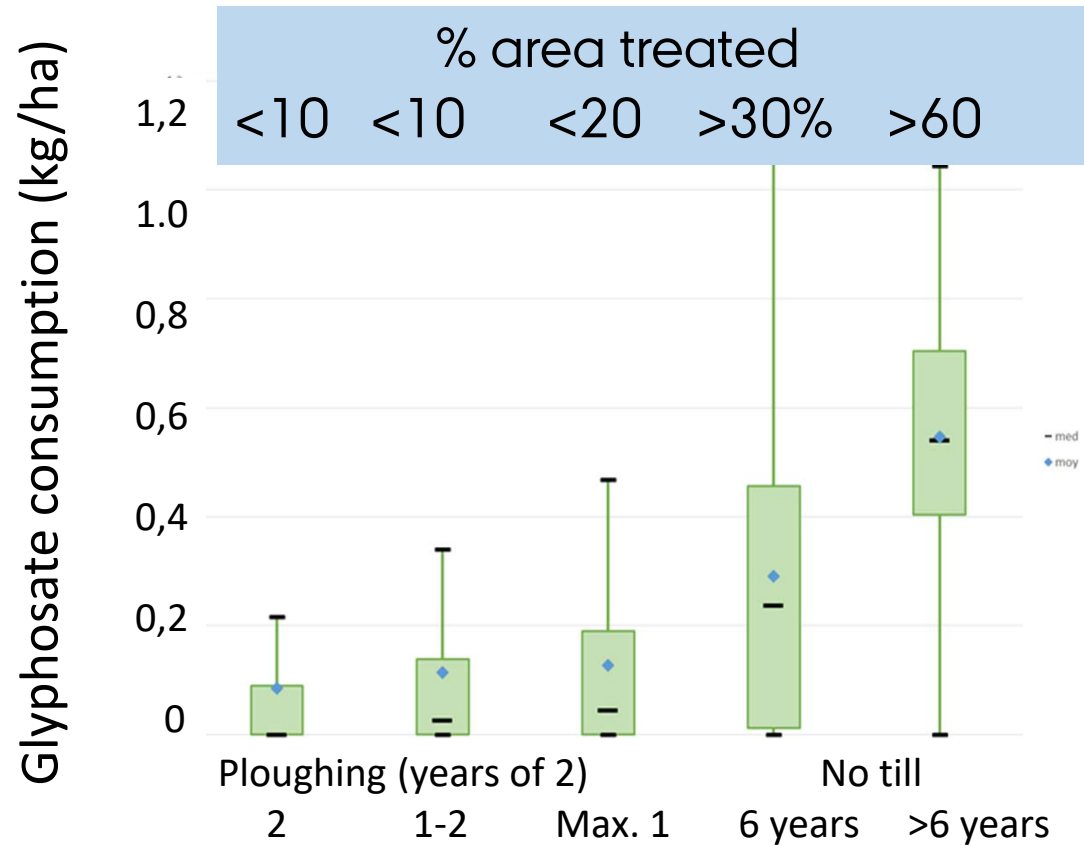


Glyphosate used on 57 % of farms (DEPHY network)

- 70 % pre-sowing or in stubble
- 26 % desiccation of cover crop
- 4 % desiccation of grass field
- 0.1 % pre-harvest

Annual consumption 9.100 t glyphosate

GLYPHOSATE USE - TILLAGE



CONCLUSIONS

Alternatives to glyphosate uses are available, techniques need further development

No estimation of economic consequences

Glyphosate ban most problematic:

- Reduced tillage
- Alfalfa seed production
- Flax (fibre)
- Control of invasive weeds
- Weed management in hillside areas



AGREED CONSEQUENCES OF GLYPHOSATE BAN IN THE EU

- Increased cost for chemical weed control
- No-till reversed to ploughing
- Increased cost for mechanical weed control
- Yield losses

Reduction in profit margin highly dependent on expected yield reduction (t.e. Kleffman vs. JKI study)

Efficacy of mechanical weed control more variable and labour intensive than glyphosate application

Long term consequences? - Hard to predict ☹️

COST OF GLYPHOSATE BAN IN THE EU

Member state	Cost + yield loss (SEK/ha)
UK	2000
JKI	320-1450
Kleffman	2150-2550
Sweden	460-1590



DENMARK

No analysis on consequences of a glyphosate ban for Danish agriculture has been carried out.

Restrictions on preharvest use in consumable crops have been implemented.
Only diluted products available for non-professional use.

GLYPHOSATE USE IN DK

1.240 t glyphosate used in 2017 = 48% of the total amount of a.s. used.

If distributed on the total area, it means that every hectar was treated with 550 g/ha (=0.44 N, N=1260 g/ha)

% area treated according to spray records:

No treatment	50%
Stubble	25%
Pre-sowing	8%
Pre-harvest	17%

CONSEQUENCES DK

- Increased cost for chemical weed control
- No-till reversed to ploughing
- Increased cost for mechanical weed control, further the effect of mechanical control is generally more dependent on climatic conditions than the efficacy of glyphosate
- Yield losses
- In long term: Increased problems with perennials – no effective substitutes
- Challenges in minor crops in which glyphosate has substituted several ‘lost’ products
- Problems in compliance with ‘rules for green fields’.
 - Late timing for terminating crops in autumn, short time for soil cultivation
 - Difficult to reverse set-a-side areas to cropping areas



Thank you for your attention