



Temporary Experiment for the Marketing of Populations

Decision 2014/150/EU

Final report



- **Background**
- **Setup of experiment**
- **Results**
 - **Administrative aspects**
 - **General aspects on populations**
 - **Specific aspects on populations**
- **Additional data assessed**
 - **Field trials Italy**
 - **Field trials Germany**
- **Evaluation by users**
- **Conclusion**





2001 – 2012 results of field trials (UK) indicated for
wheat populations

- higher resilience than varieties,
- greater buffer capacity against adverse environmental conditions and diseases,
- aimed at organic and low input production

Council Directive 66/402/EEC

- Article 3 prevents the marketing of seeds of cereal populations as they cannot be officially certified.
- Article 13a enables the organisation of temporary experiments under specified conditions within which the release from certain obligations of the Directive is possible.



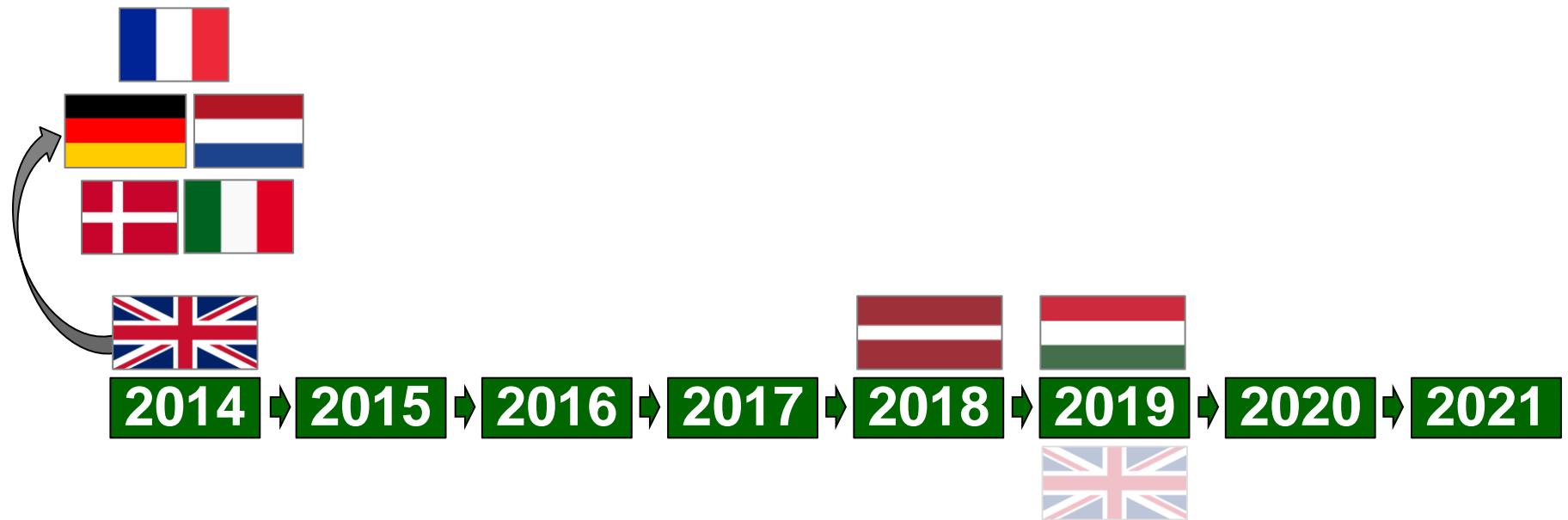
➤ Decision 2014/150/EU:

“Temporary experiment providing for certain derogations for the marketing of populations of the plant species wheat, barley, oats and maize”

- a.) Can populations be identified based on information on their breeding and production method, the varieties used in the crossing and the main characteristics of the populations?
- b.) Can the identity of seed from marketed populations be based on traceability requirements and identification of the production region?



Participating Member States





Set up experiment

Populations authorised needed to comply with following requirements:

- a) result from a **given combination of genotypes**
- b) are **considered as units** with regard to their suitability for being reproduced unchanged once established in a given region of production with specific agro-climatic conditions
- c) are generated by one of the following techniques:
 - i **crossing** > 5 varieties in all combinations, **bulking** of the progeny, **exposing** stock to natural selection in successive generations.
 - ii **growing together** > 5 varieties of predominantly cross-fertilising species, **bulking** the progeny, repeatedly **re-sowing** and **exposing** stock to natural selection until plants of original varieties are no longer present
 - iii **inter-crossing varieties** using crossing **protocols different** from those in i or ii to produce a similarly diverse population that does not contain varieties



Set up experiment

- participating Member States needed to record and report information

Administrative aspects	Populations	
	general aspects	specific aspects
• no. of applications	• species	• technique used
• no. of authorisations	• denomination	• description of trials carried out
• no. of withdrawals	• size of companies (breeding, producing)	• results field inspection, seed testing (C2 standard met?)
• no. of living/active populations	• seed quantities produced per population	• general remarks (e.g. diseases, pests, weeds...)
• seed production and marketing of populations	• seed quantities marketed per population	• valuation of populations by users
• description of authorisation procedures	• seed destination	Public relations activities <ul style="list-style-type: none">• field days, seminars, networking events for farmers, millers, bakeries• information for consumers
• costs for applicants	• type of production system (organic, conventional; start 2019)	

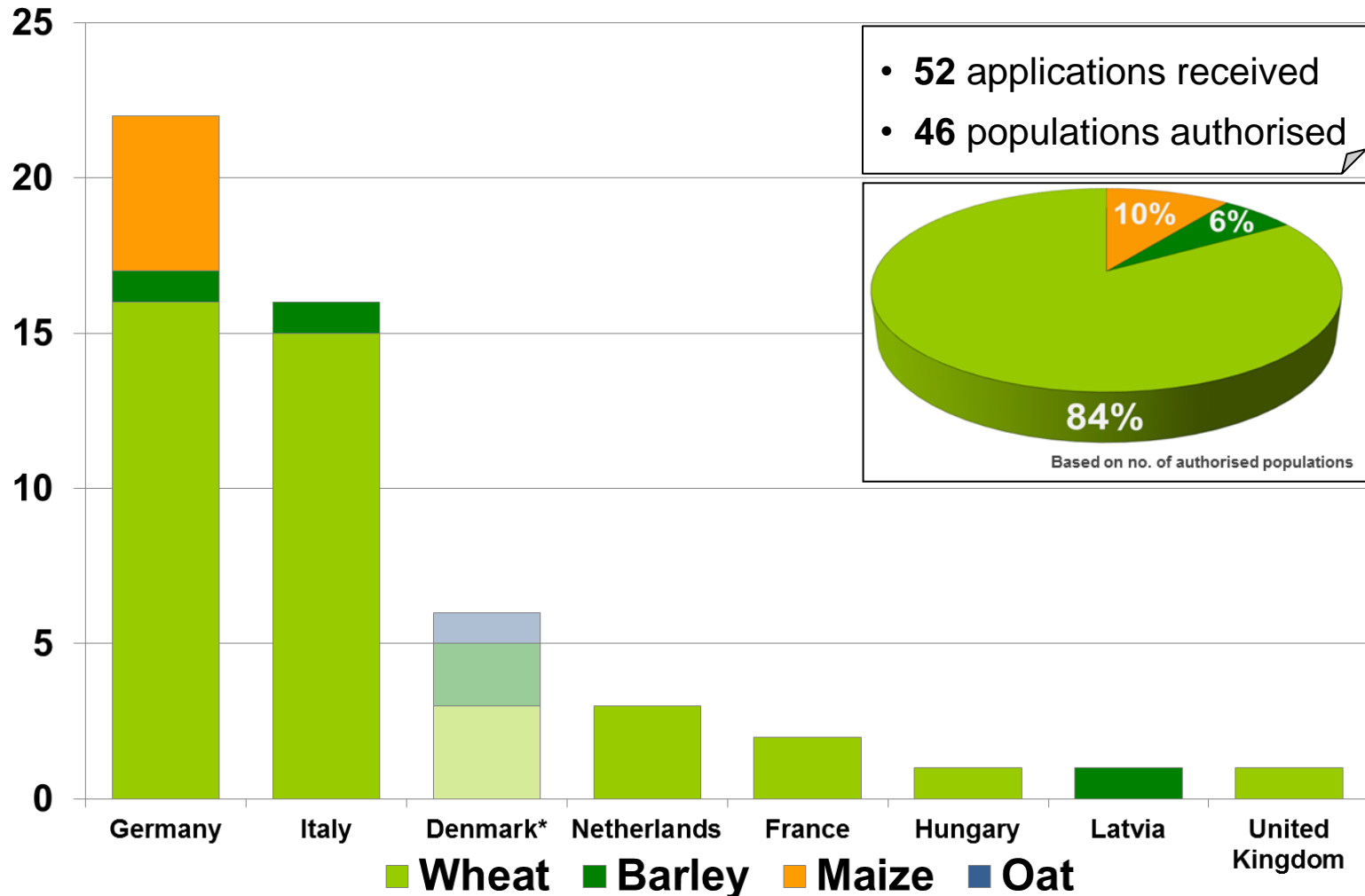


Authorisation process

- based on compliance with requirements of Decision 2014/150/EU
- authorisation given by
 - Plant Variety Offices or
 - Plant Protection Services or
 - Certification agencies
- no fees charged for authorisation process
- normal fees for field inspection and seed testing
 - except FR: no costs at all



Number of populations - per country -

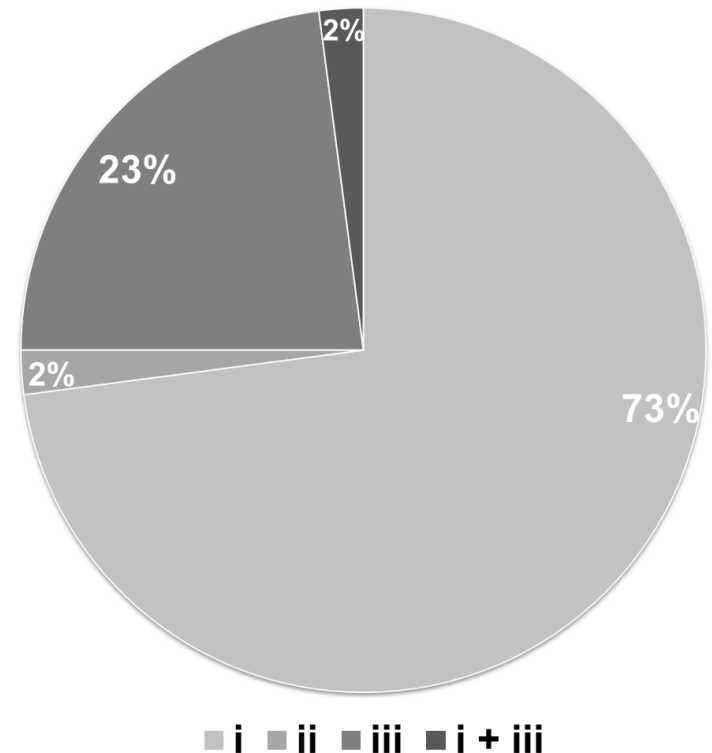


* Applications existed but were withdrawn prior authorisation



Techniques for generating populations

- i **crossing** > 5 varieties (**73%**).
- ii **growing together** > 5 varieties (**2%**)
- iii **inter-crossing varieties** using **different crossing protocols** than i and ii (**23%**)
- i + iii mixture of i and iii (**2%**)

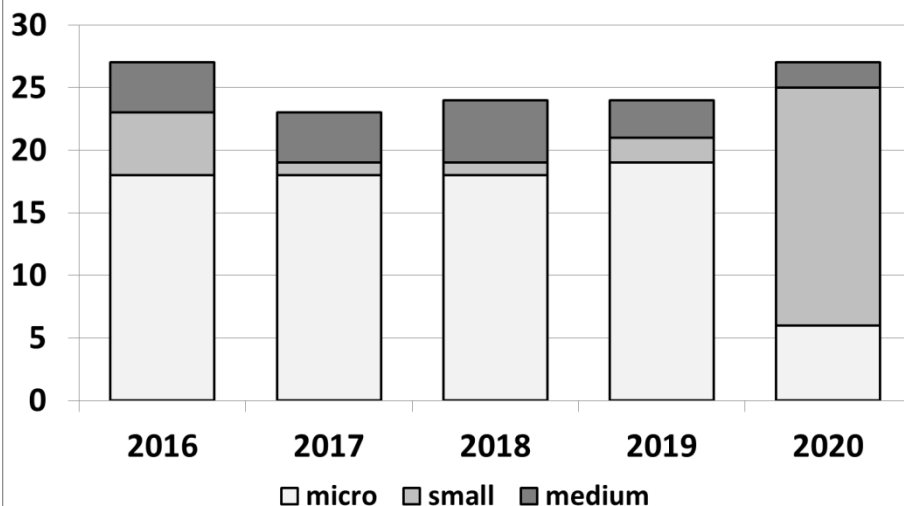




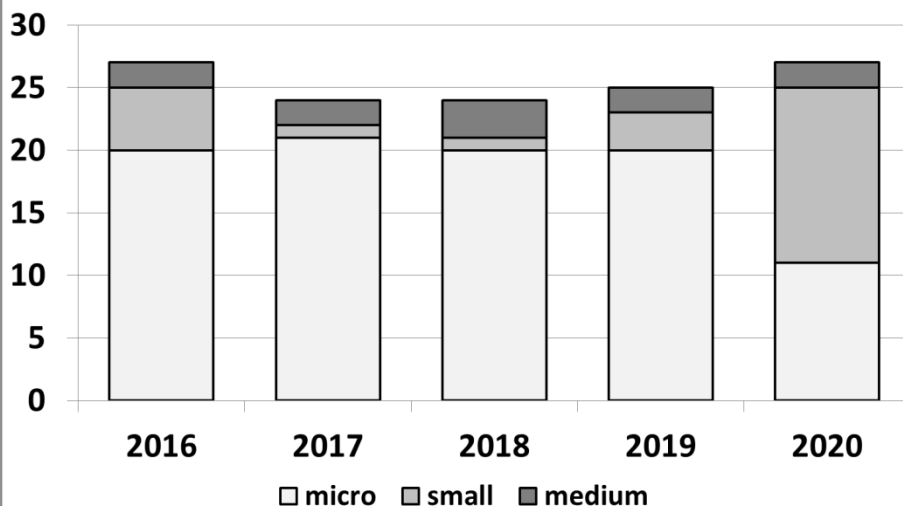
Company sizes

micro: <10
small: 10 - 49
medium: 50 - 249
large: >250 employees

Breeding Companies



Seed Producing Companies



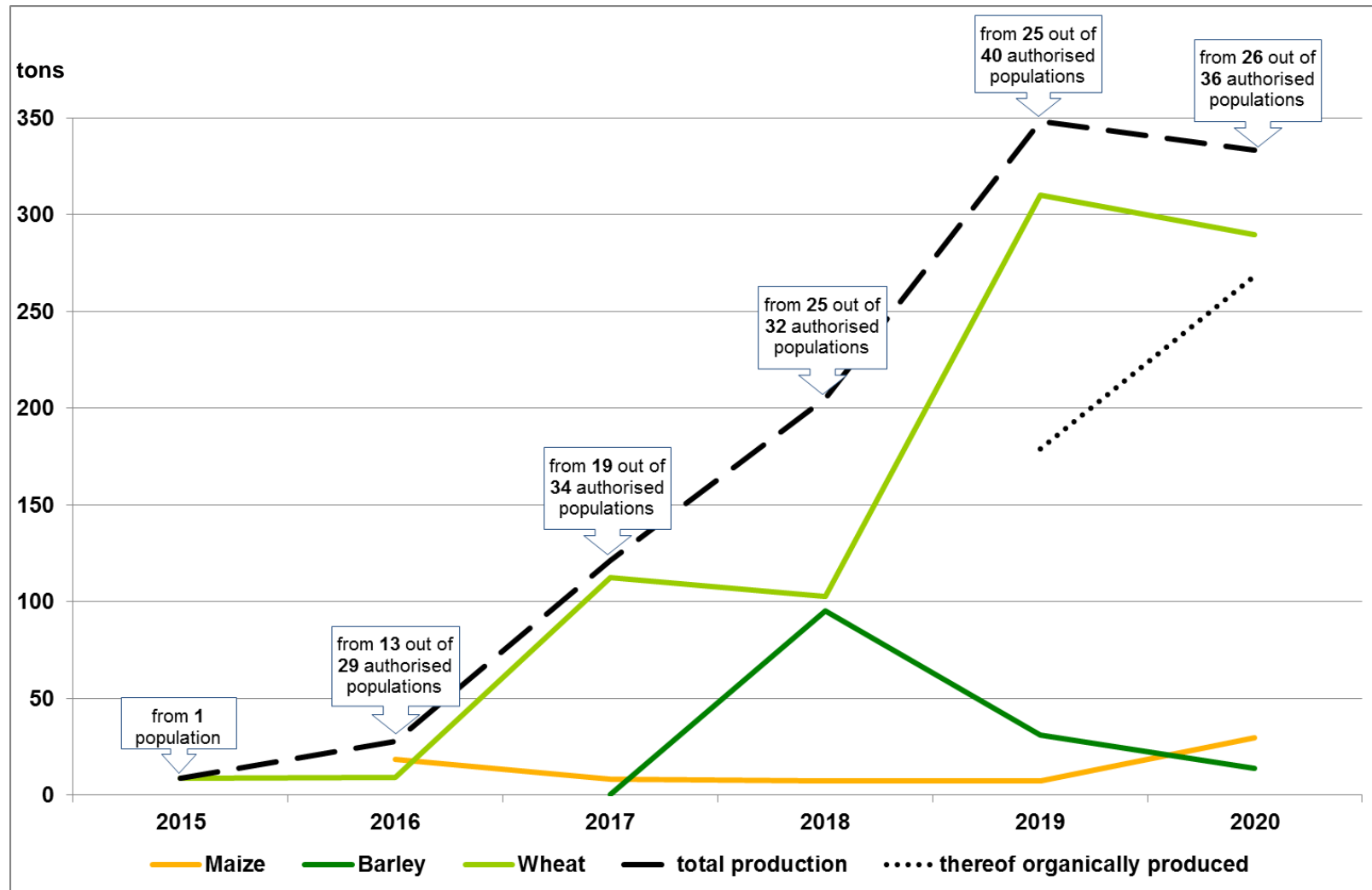
2020

IT:

- increased demand in seed
- increased workload
- increased demand in personnel



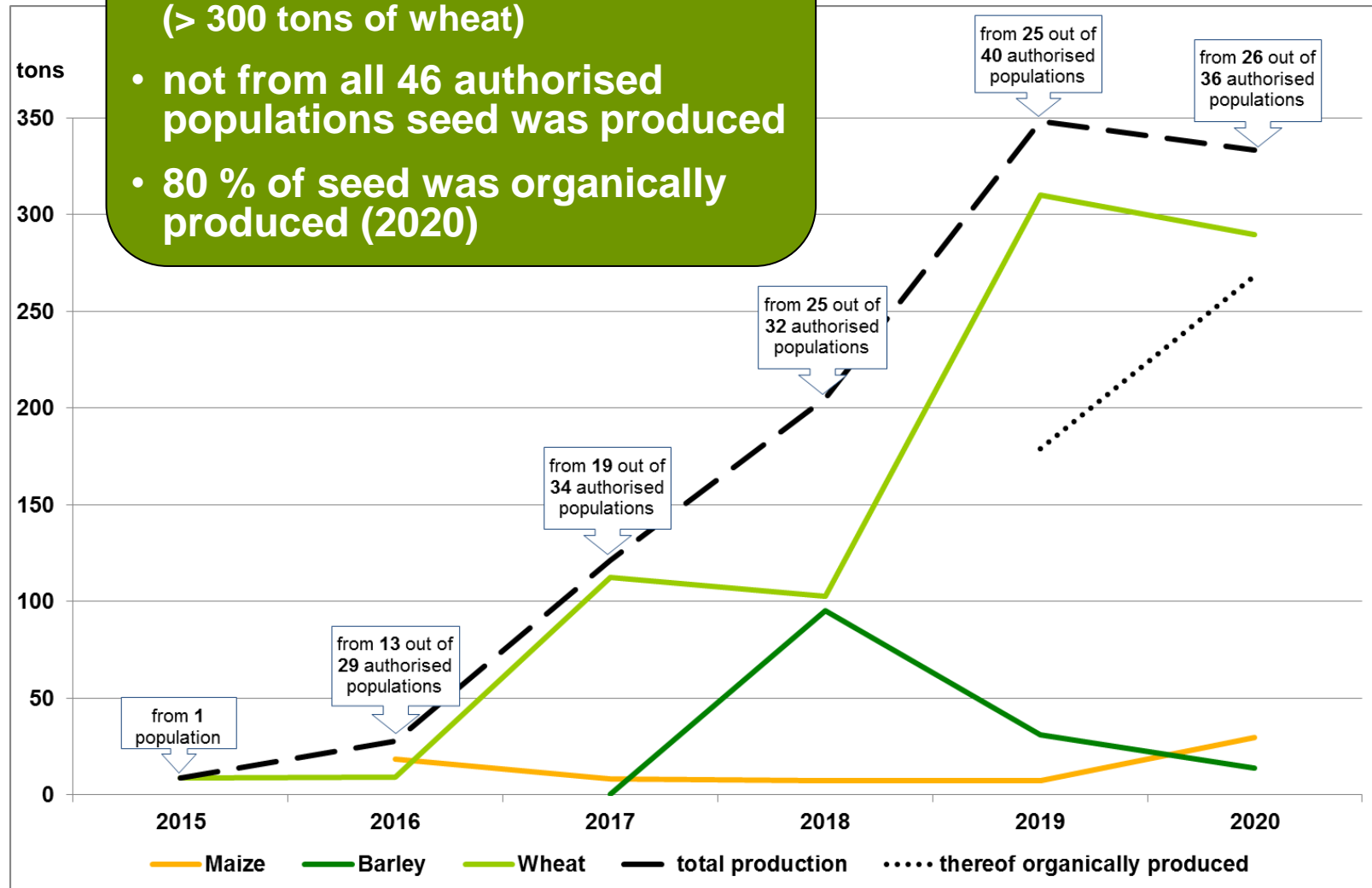
Quantities produced - per species -





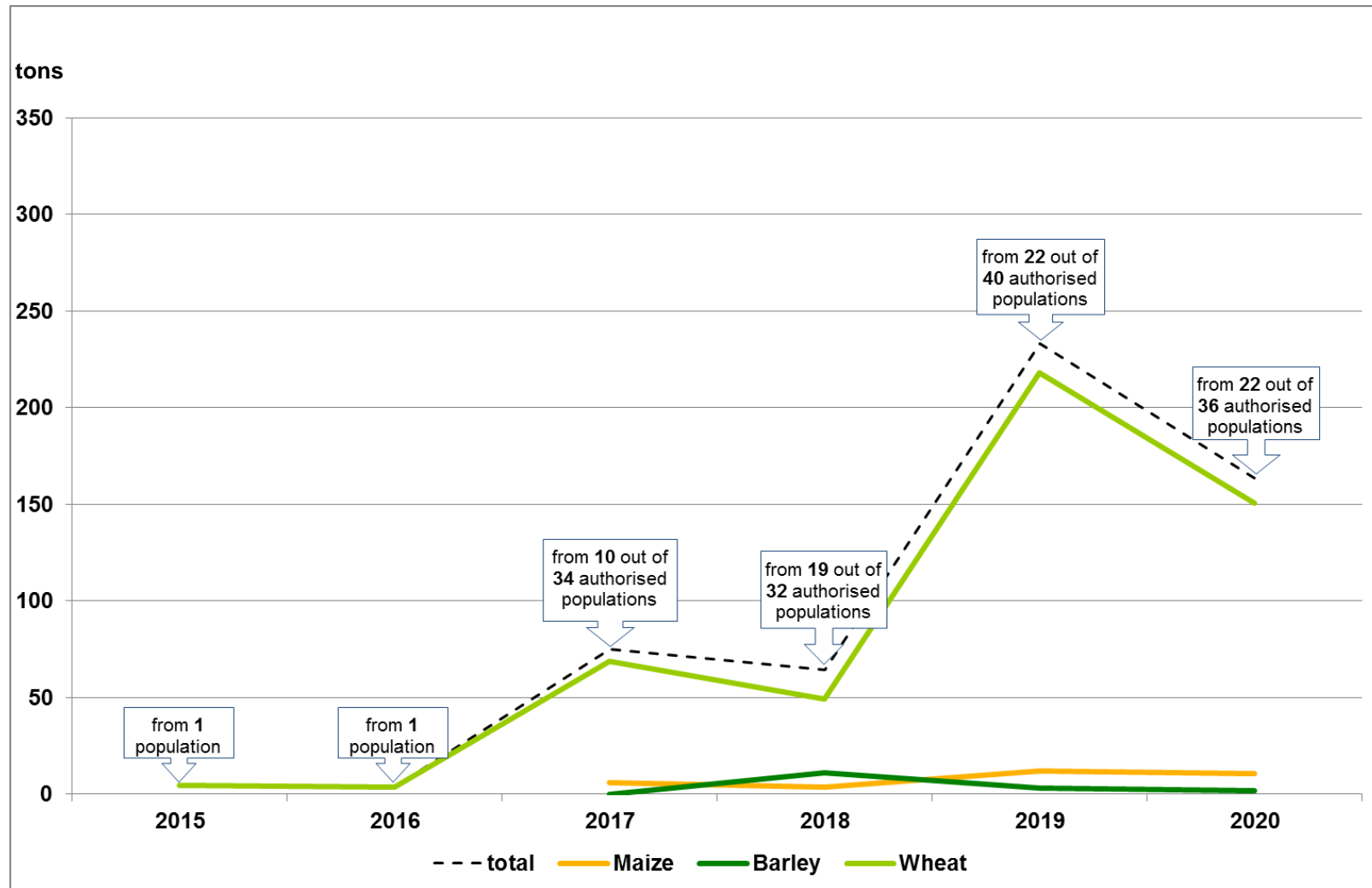
Quantities produced - per species -

- Produced seed quantities reached ~ 350 tons (> 300 tons of wheat)
- not from all 46 authorised populations seed was produced
- 80 % of seed was organically produced (2020)





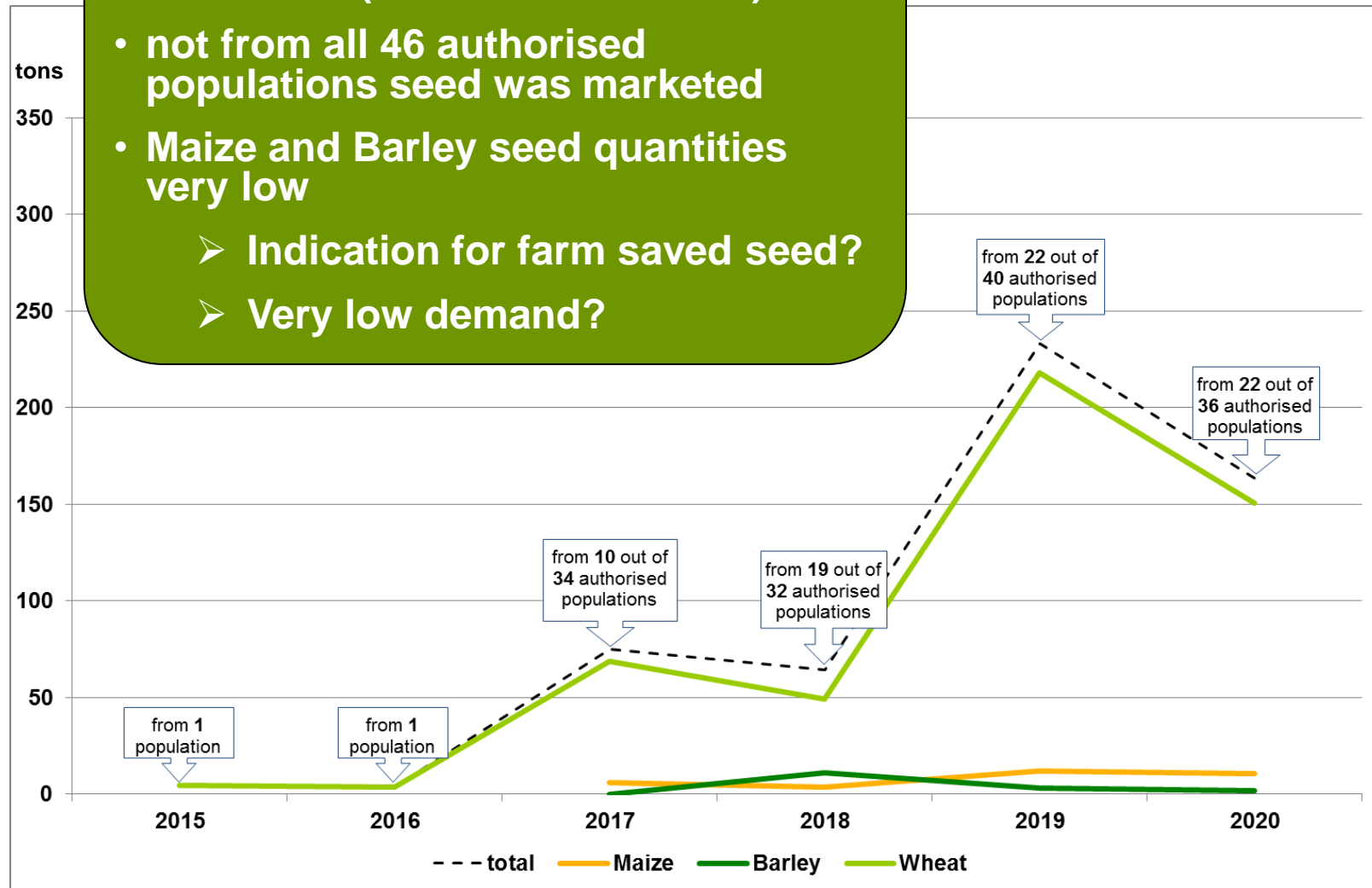
Quantities marketed - per species -





Quantities marketed - per species -

- Marketed seed quantities reached ~ 240 tons (~ 220 tons of wheat)
- not from all 46 authorised populations seed was marketed
- Maize and Barley seed quantities very low
 - Indication for farm saved seed?
 - Very low demand?





price for seed of populations

MS	species / population	percentage of comparable prices		in relation to the comparable prices
DE				
	Maize			
	Evolino, Almito, Bogdan, Weihenstephaner 3	-	13	↓
		+	33	↑
	Weihenstephaner 2	-	23	↓
		+	16	↑
	Soft Wheat			
	Convento C, Convento E, Brandex, Liocharls	+	6	↑
FR				
	Soft Wheat			
	Megamix	+	21	↑
		+	84	↑ ↑
IT				
	Soft Wheat			
	BIO2 TENERI	+	111	↑ ↑
		+	193	↑ ↑ ↑
	BIOADAPT	+	104	↑ ↑
		+	184	↑ ↑ ↑
	MIX TENERO TOSCANA 1	-	2	↓
		+	37	↑
	MIX TENERO TOSCANA PA1	-	2	↓
		+	37	↑
	SOLIBAM TENERO FLORIDDIA	+	89	↑ ↑
		+	163	↑ ↑ ↑
	SOLIBAM TENERO LI ROSI	+	99	↑ ↑
		+	177	↑ ↑ ↑
	Durum Wheat			
	MIX DURO TOSCANA PA1	+	40	↑
	SOLIBAM DURO PETACCIATO	+	218	↑ ↑ ↑
	Barley			
	MIX48	-	16	↓
LV				
	Barley			
	Mirga	+/-	0	→

↑ costs more than
↓ costs less than
organically produced
conventionally produced
seed of varieties

costs as much as
→ category PB seed



Based on
average prices
from 2017 to 2020
for seed of varieties



price for seed of populations

MS	species / population	percentage of comparable prices	in relation to the comparable prices
DE	Maize		
	Evolino, Almito, Bogdan, Weihenstephaner 3	- 13	↓
		+ 33	↑
	Weihenstephaner 2	- 23	↓
		+ 16	↑

↑ In general higher than **conventionally** produced seed (up to +200%)

↓ Maize: lower than **organically** produced seed

↑ Wheat: mostly higher than **organically** produced seed

↓⇒ Barley:

IT: lower than **conventionally** produced seed

LV: equalization to cat. PB seed

	SOLIBAMTENERO LI ROSI	+ 99	↑↑
		+ 177	↑↑↑
Durum Wheat	MIX DURO TOSCANA PA1	+ 40	↑
	SOLIBAM DURO PETACCIATO	+ 218	↑↑↑
Barley	MIX48	- 16	↓
LV Barley	Mirga	+/- 0	→

Based on
average prices
from 2017 to 2020
for seed of varieties





How to characterise populations to facilitate identification?

- comparison of seed samples from different years
- carried out in 2 years
- comprehensive evaluation based on characteristics from CPVO protocols

Overview of samples of populations being evaluated in 2020.

Species	Denomination of population	Member state	Origin of sample
Soft wheat	Evolito A	DE	Standard 2015 Breeder 2019
	Evolito B	DE	Standard 2015 Breeder 2019
	Evolito E	DE	Standard 2015 Breeder 2019
	Liocharls	DE	Standard 2015 Breeder 2019
	Bioadapt Querciola (Cà dei Fiori)	IT	Breeder 2017 Breeder 2019
	Solibam tenero Floriddia	IT	Standard 2017 Breeder 2019
	Solibam tenero Liroso	IT	Breeder 2017 Breeder 2019
Durum wheat	EVOLDUR13 A	IT	Standard 2017 Breeder 2019
	Solibam duro Floriddia	IT	Standard 2017 Breeder 2019
	Solibam duro Recchia	IT	Breeder 2017 Breeder 2019
	Solibam duro Petacciato	IT	Breeder 2017 Breeder 2019
Barley	Mix 48 (autumn sowing)	IT	Breeder 2016 Breeder 2019



Additional data assessed - Italy



	Durum wheat	Soft Wheat	Barley
ANOVA	Time of ear emergence Culm: glaucosity of neck Ear: glaucosity Ear: length of awns at tip relative to length of ear Ear: length (excluding awns) Plant: length Lower glume: hairiness of external surface Awn: colour	Time of ear emergence Culm: glaucosity of neck Ear: glaucosity Ear: shape in profile Ear: density Ear: length Plant: length Awns/scurs: presence Awns/scurs at tip of ear: length	Flag leaf: intensity of anthocyanin coloration of auricles Time of ear emergence (1 st spikelet visible on 50% of ears) Ear: glaucosity Plant: length (stem, ear and awns) Awns: intensity of anthocyanin coloration of tips
Duncan	Time of ear emergence Culm: glaucosity of neck Ear: glaucosity Ear: length of awns at tip relative to length of ear Ear: length (excluding awns) Plant: length Lower glume: hairiness of external surface Awn: colour	Time of ear emergence Culm: glaucosity of neck Ear: glaucosity Ear: shape in profile Ear: density Ear: length Plant: length Awns/scurs: presence Awns/scurs at tip of ear: length	Flag leaf: intensity of anthocyanin coloration of auricles Time of ear emergence (1 st spikelet visible on 50% of ears) Ear: glaucosity Plant: length (stem, ear and awns) Awns: intensity of anthocyanin coloration of tips
Shannon + t-Test	Time of ear emergence Culm: glaucosity of neck Ear: glaucosity Ear: length of awns at tip relative to length of ear Ear: length (excluding awns) Plant: length Lower glume: hairiness of external surface Awn: colour	Time of ear emergence Culm: glaucosity of neck Ear: glaucosity Ear: shape in profile Ear: density Ear: length Plant: length Awns/scurs: presence Awns/scurs at tip of ear: length	Flag leaf: intensity of anthocyanin coloration of auricles Time of ear emergence (1 st spikelet visible on 50% of ears) Ear: glaucosity Plant: length (stem, ear and awns) Awns: intensity of anthocyanin coloration of tips

Anova, Duncan:

Assessment of distinctness and stability of populations

Shannon:

defines identity based on phenotype frequencies

- **No significant difference detectable**
- **significant difference detectable**
- **significant difference only in some populations detectable**



	Durum wheat	Soft Wheat	Barley
	Time of emergence	Time of emergence	Flour of intensity of the original line of auricles (rs)

Methods

- provide no information on breeding technique
- provide no information on varieties used in the original cross
- reveal differences that are not visually detectable
- show that obvious differences are not necessarily significant
- suitable for characterising populations
- different populations were identified
 - extremely time-consuming
 - not suitable for field inspection
 - not suitable for regular post-control trials

in
detect

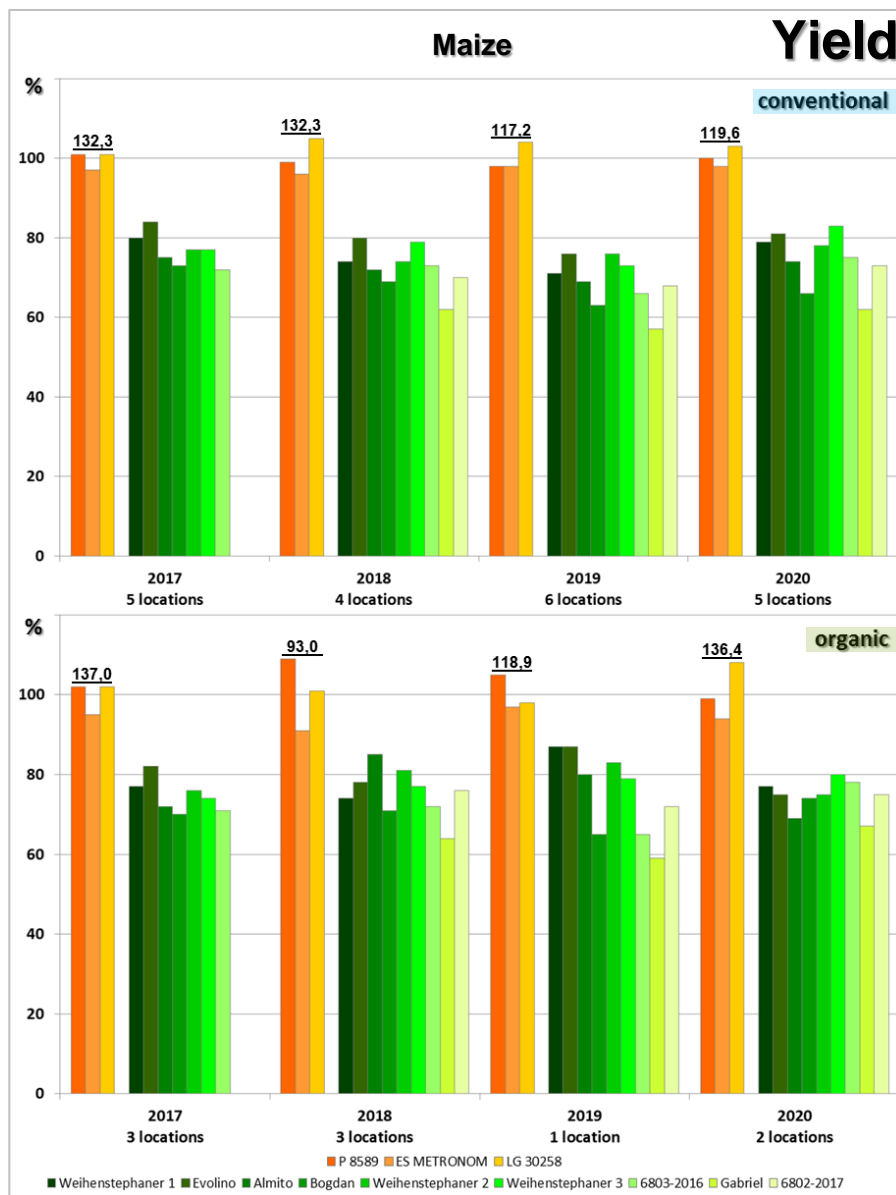


How do populations perform in comparison to control varieties?

- populations evaluated
 - winter wheat: 7
 - spring wheat: 8
 - maize: 9
- duration
 - winter and spring wheat: 2017 – 2018
 - maize: 2017 – 2020
- up to 5 locations per year
- under organic and conventional conditions
- VCU characteristics analysed

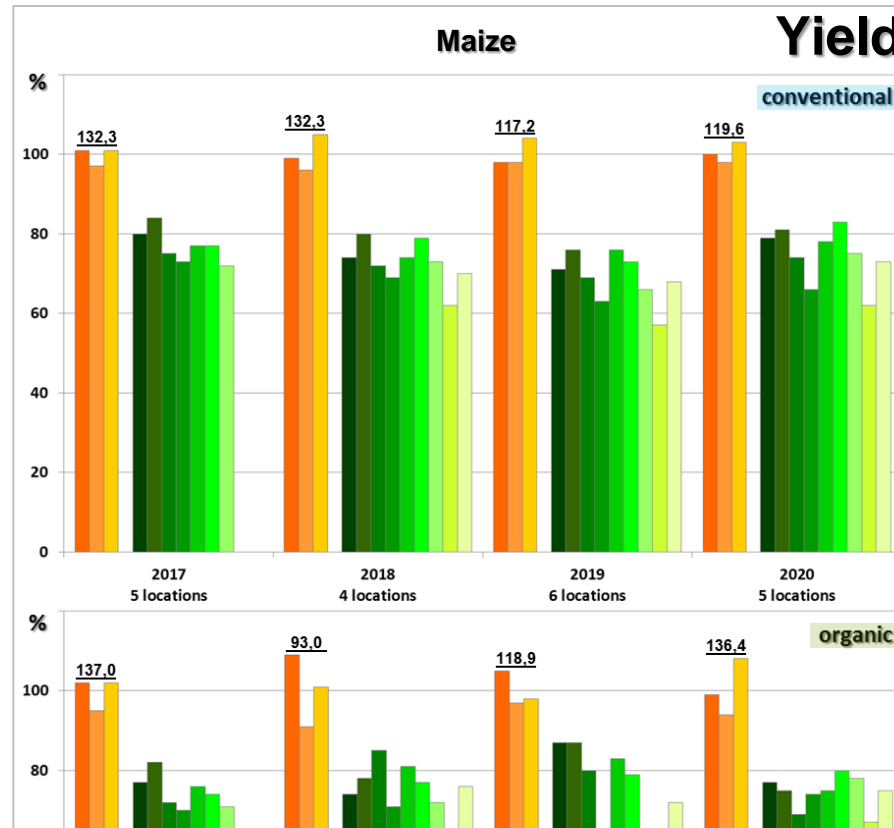


Additional data assessed - Germany





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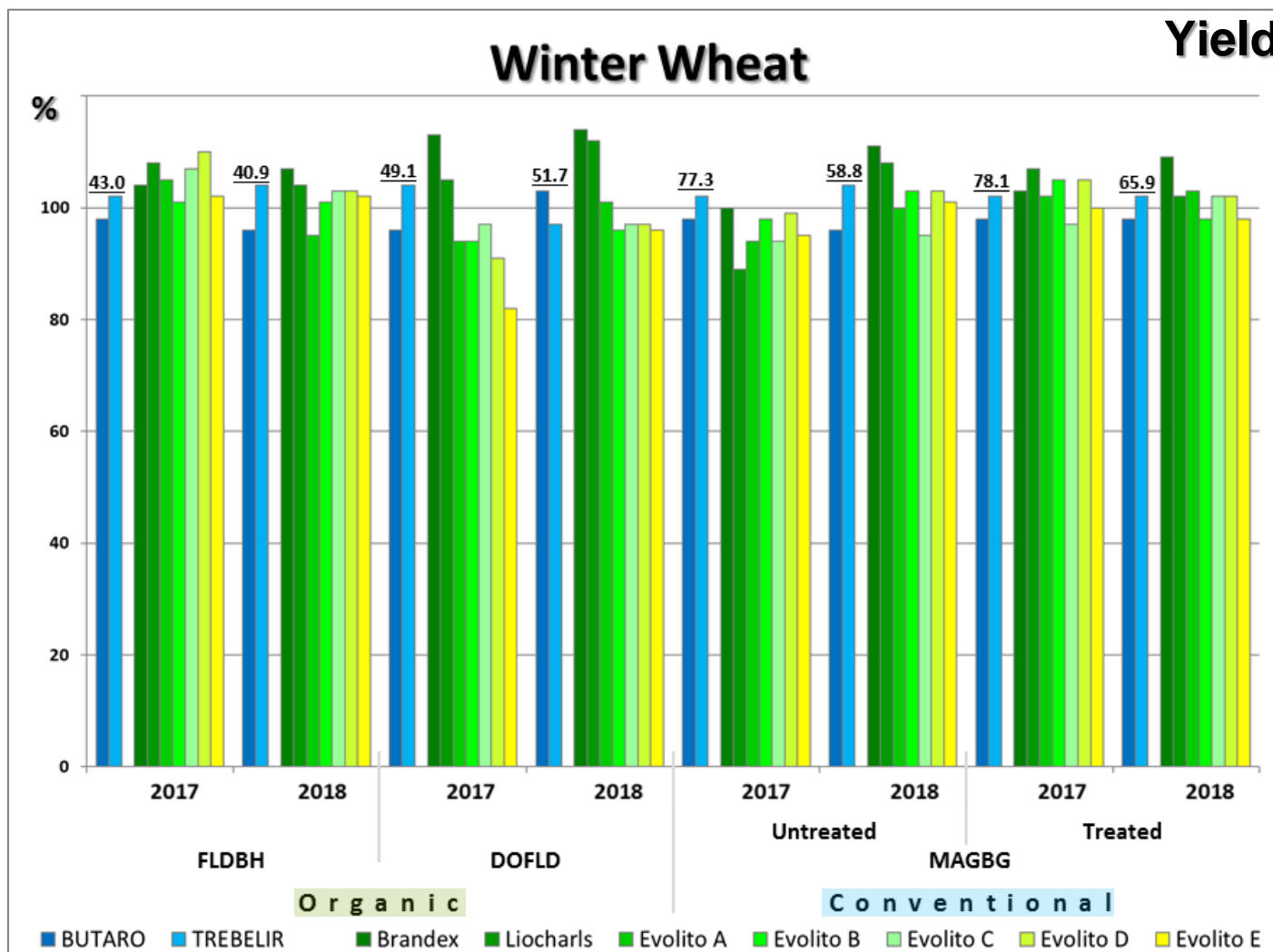
Yield

- 60 – 80 % compared to control varieties, but
 - control varieties high yielding (VCU: 7 – 8)

■ P 8589 ■ ES METRONOM ■ LG 30258
■ Weihenstephaner 1 ■ Evolino ■ Almito ■ Bogdan ■ Weihenstephaner 2 ■ Weihenstephaner 3 ■ 6803-2016 ■ Gabriel ■ 6802-2017

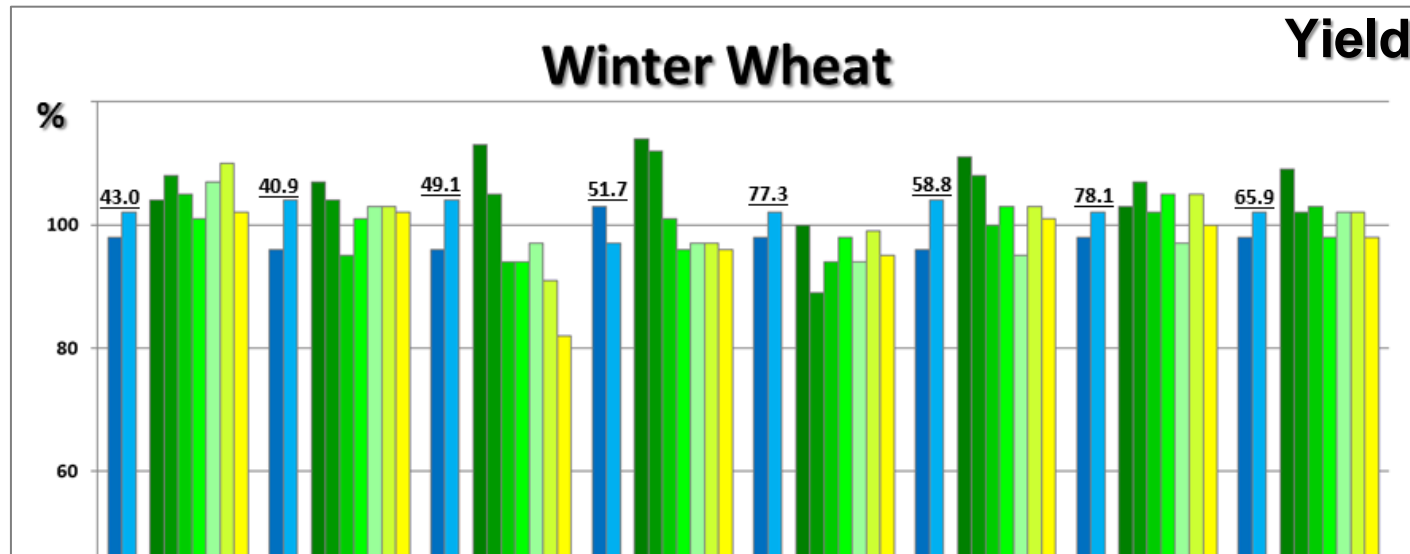


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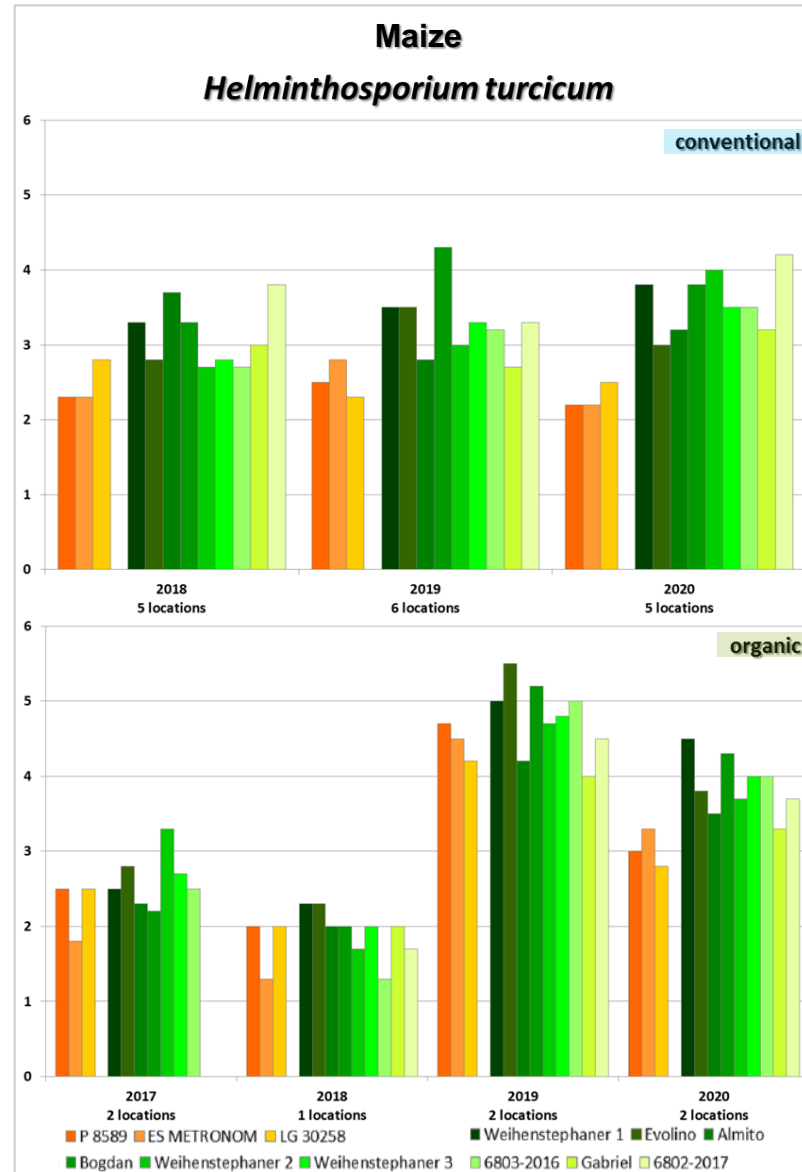
Yield

- Comparable to control varieties, but
 - control varieties low yielding (VCU under organic conditions: 3 - 4)
 - very low number of trial sites

■ BUTARO ■ TREBELIR ■ Brandex ■ Liocharls ■ Evolito A ■ Evolito B ■ Evolito C ■ Evolito D ■ Evolito E

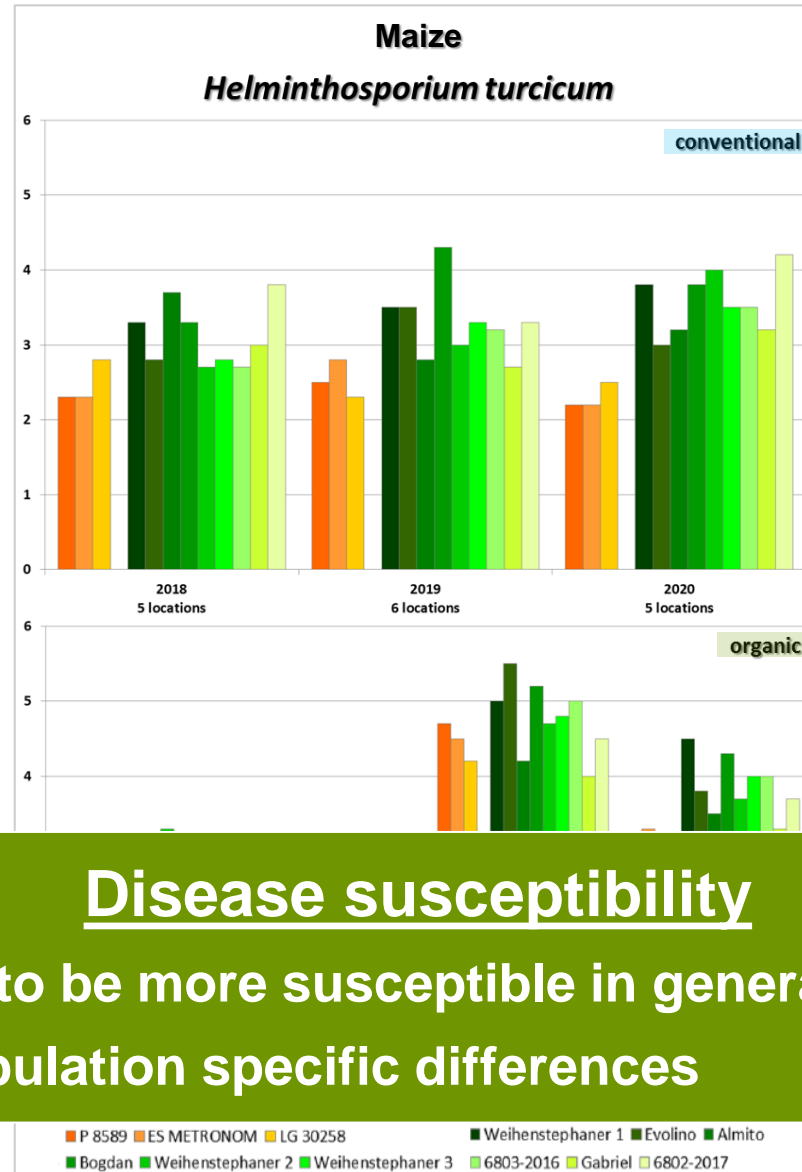


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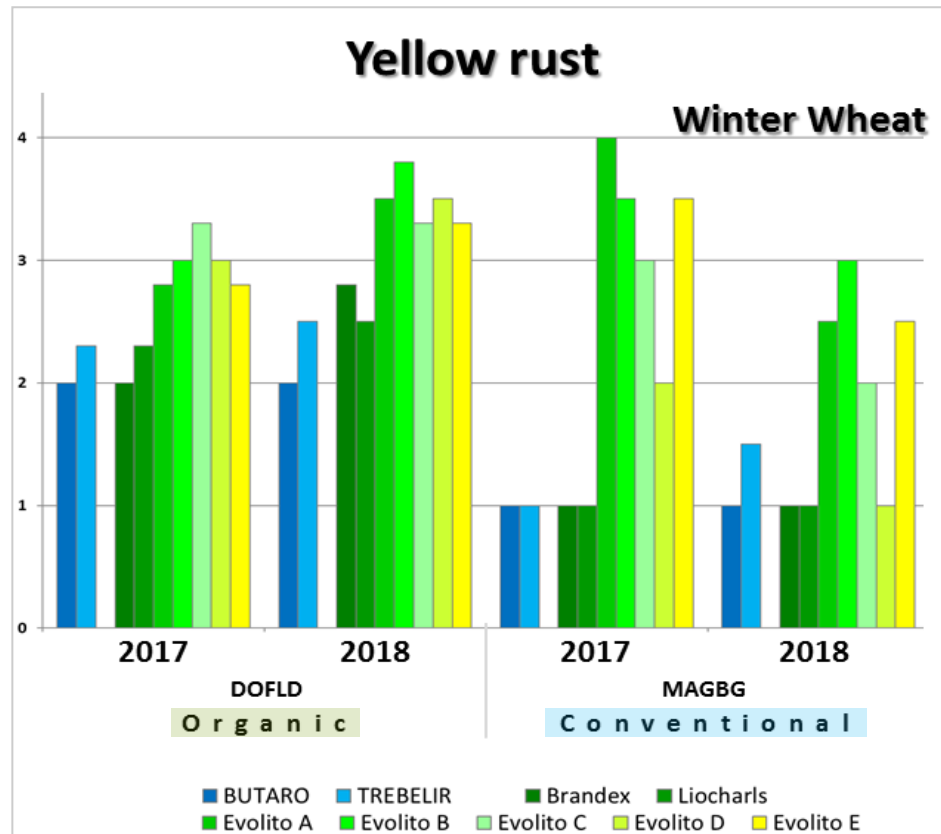


Disease susceptibility

- Tend to be more susceptible in general, but
 - population specific differences

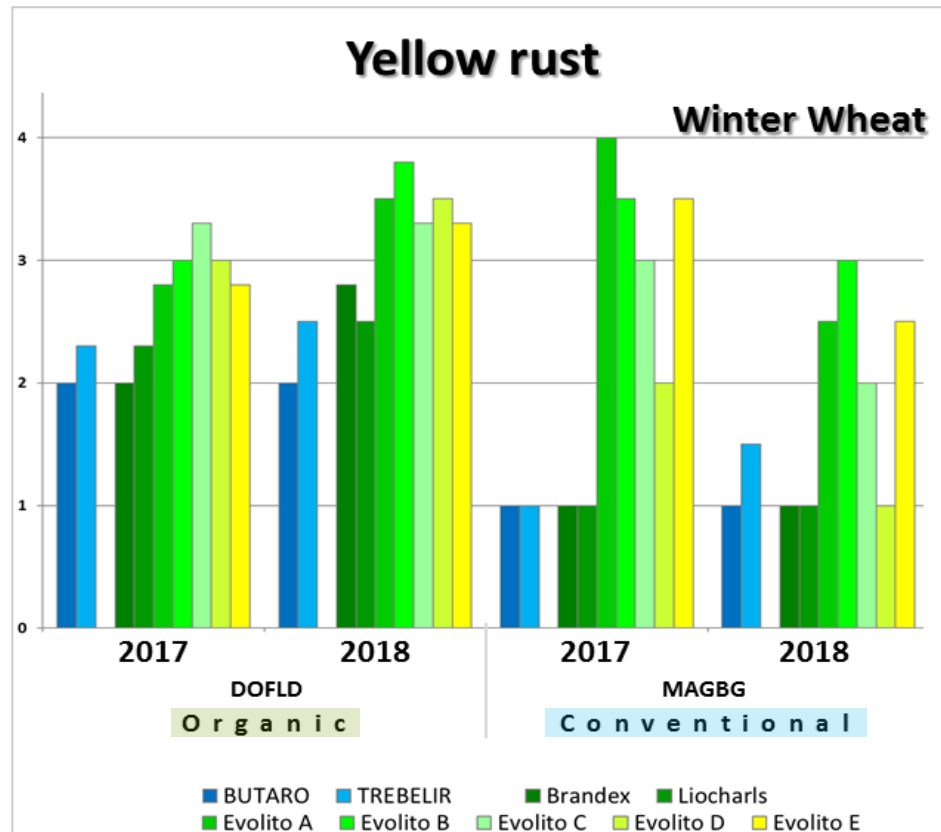


Additional data assessed - Germany





Additional data assessed - Germany



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Evaluation by users





Evaluation by users



**Change in daily
work routine**



Evaluation by users



Advantages

**Good adaptation in soils
with low fertility**

**Change in daily
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Evaluation by users

**Improved adaptability
in general, to climatic
changes specifically,
risk spreading**

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Advantages



Evaluation by users

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Evaluation by users

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Evaluation by users

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good productive level in relation to low impact of technical means used

Good control of weed and disease development

Less sensitive to lodging

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Evaluation by users

Advantages

good productive level in relation to low impact of technical means used

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Satisfiable yield

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Evaluation by users

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Similar to pure line varieties used in organic agriculture

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Farm saved seed

Change in daily work routine

Repurchase/sowing of farm-saved seed indicates that end-users are satisfied with the populations' performance

Interest in developing own populations





Disadvantages

poor performance
on first trial to grow
populations
(barley)



slightly lower
yield

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Evaluation by users

probably negative
influence on sales
of certified seed
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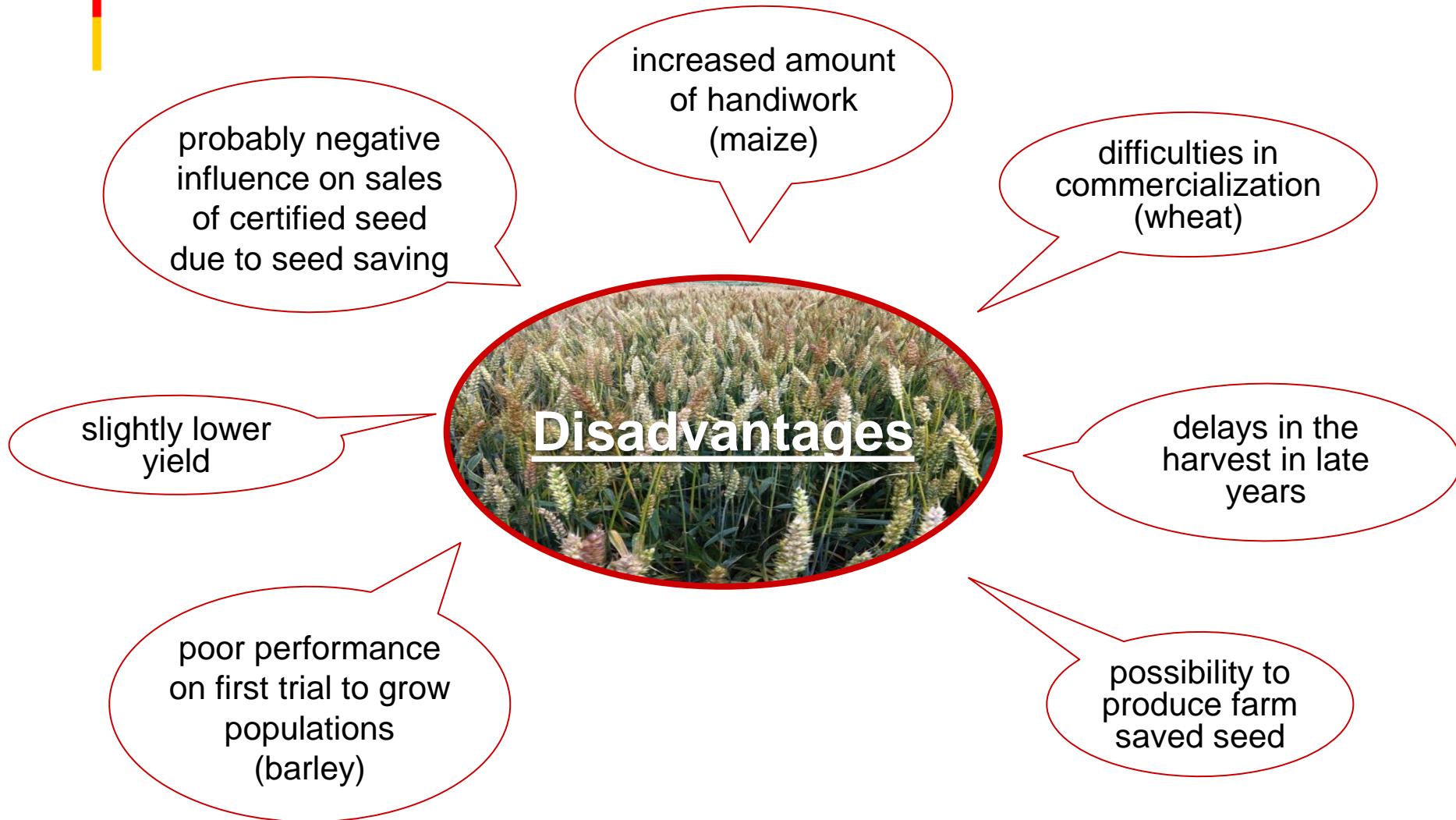
Disadvantages

delays in the
harvest in late
years

poor performance
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populations
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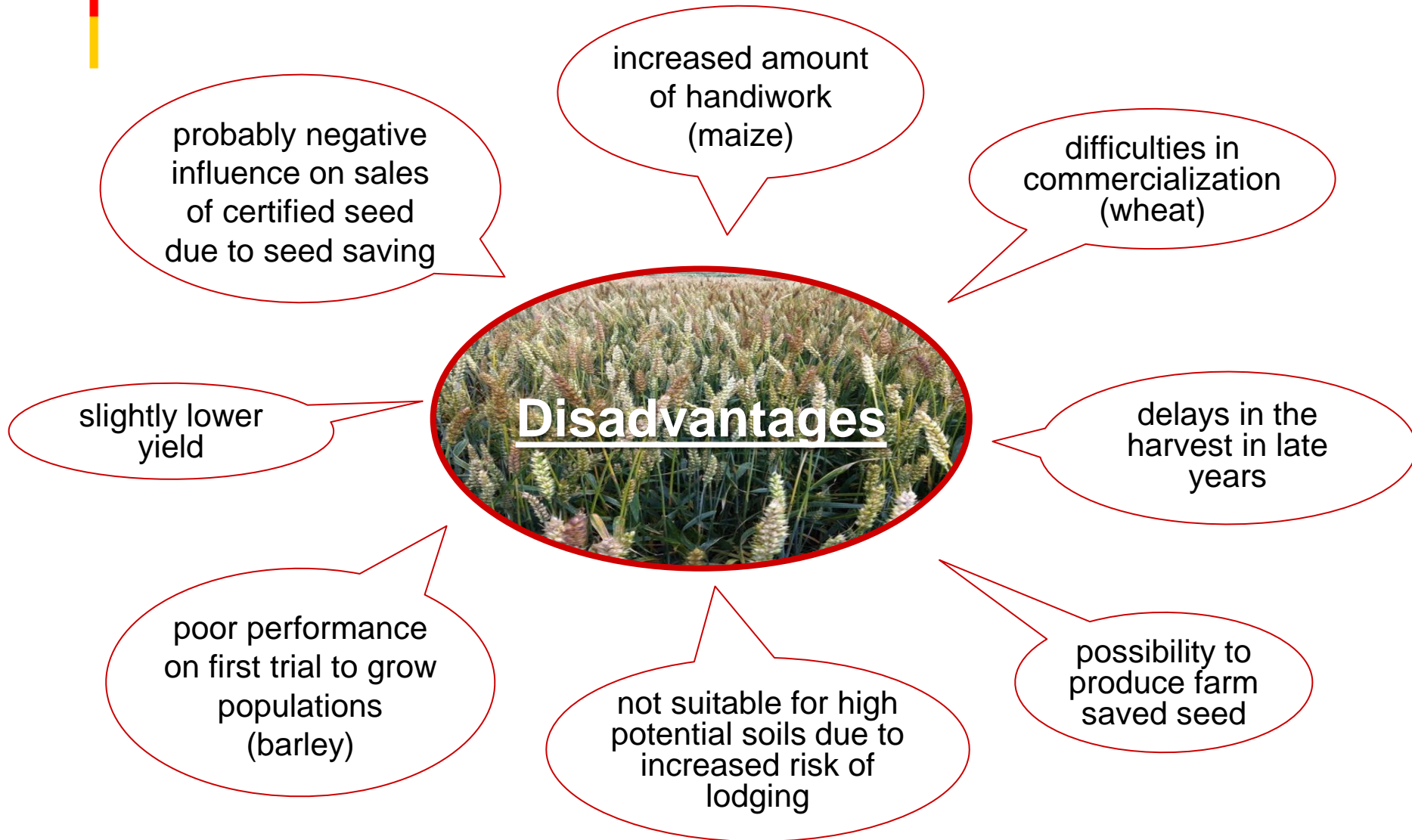


Evaluation by users





Evaluation by users





Evaluation by users





Evaluation by users



difficult to describe
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Evaluation by users



interest for farmers
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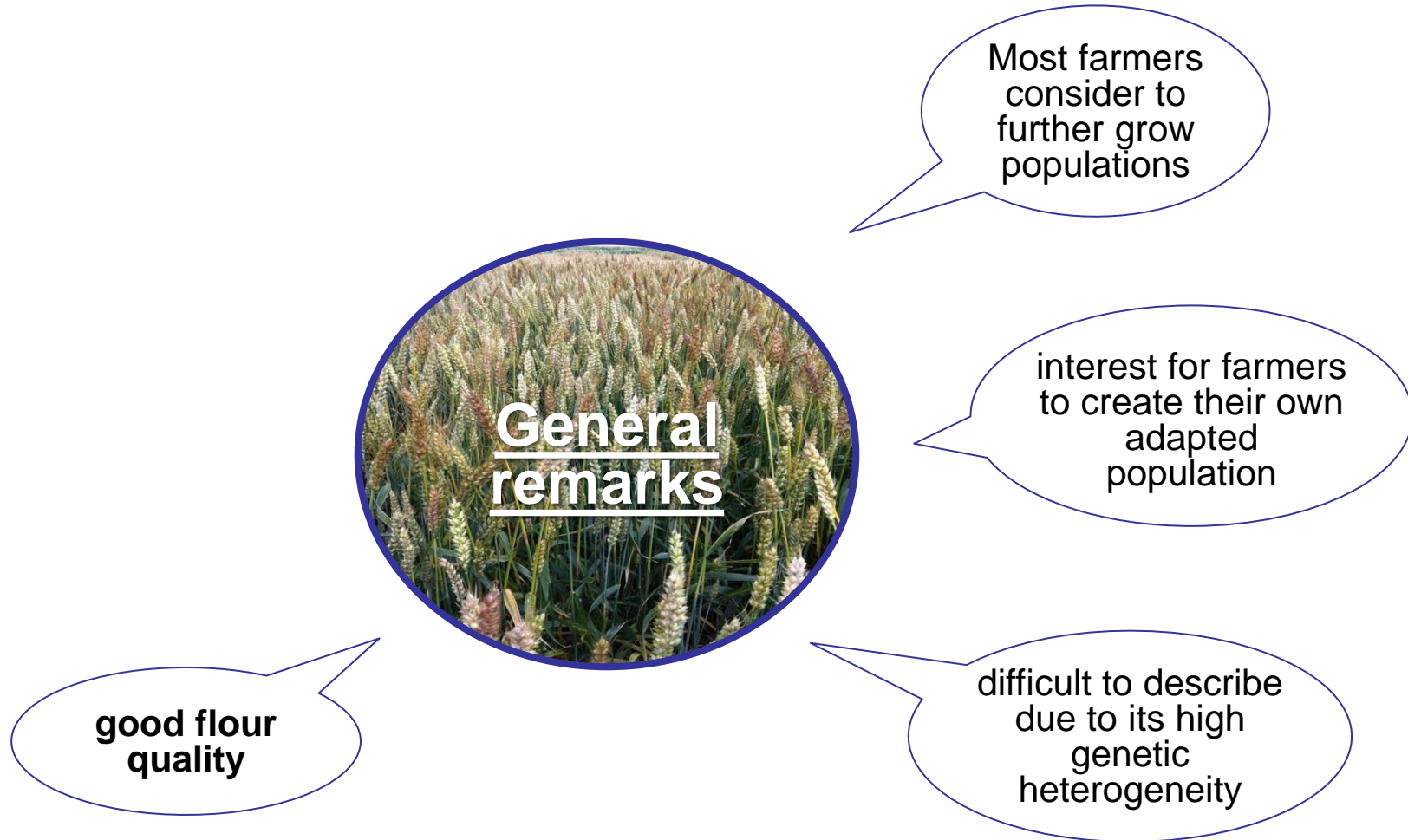
Most farmers
consider to
further grow
populations

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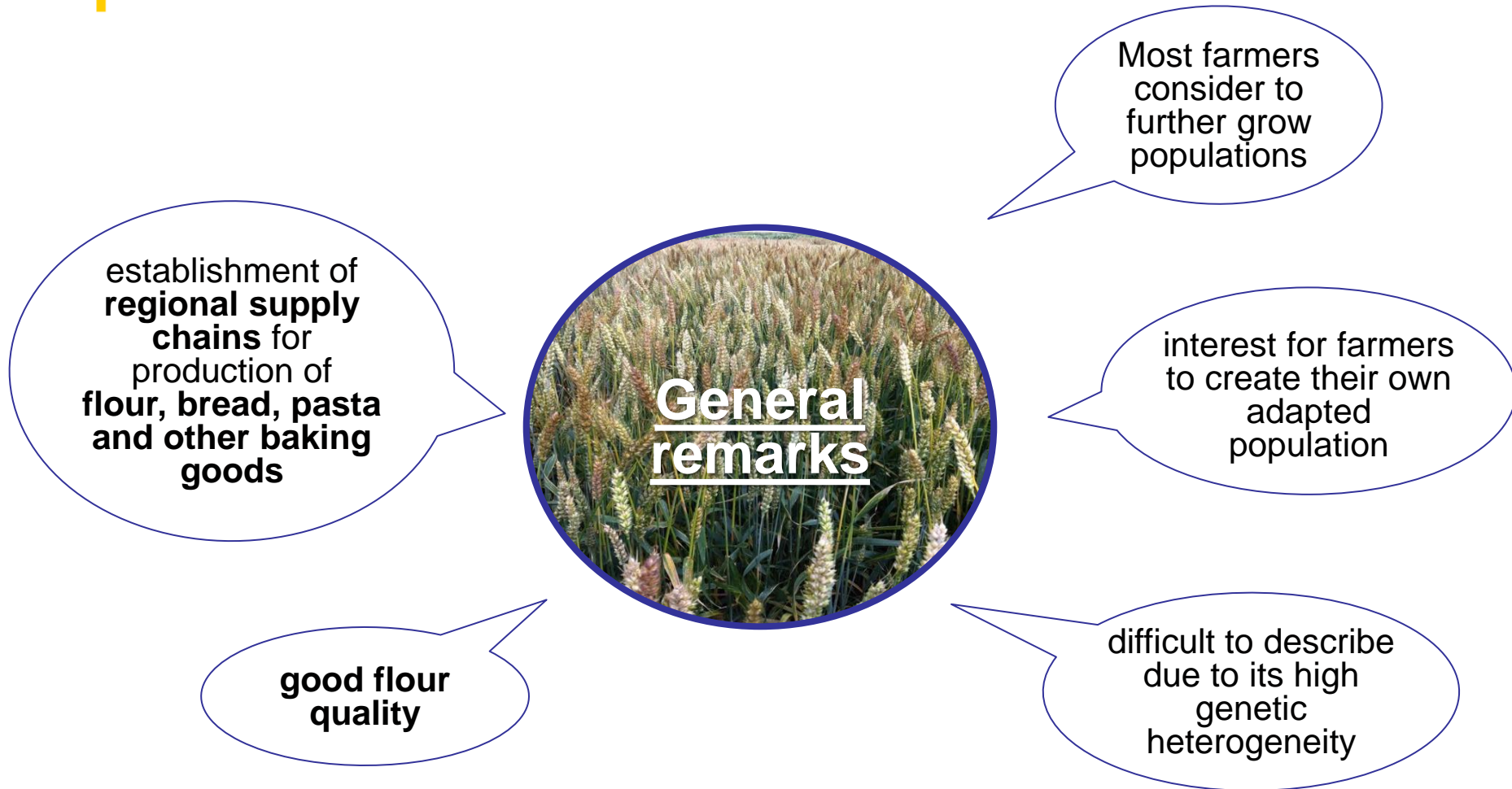


Evaluation by users



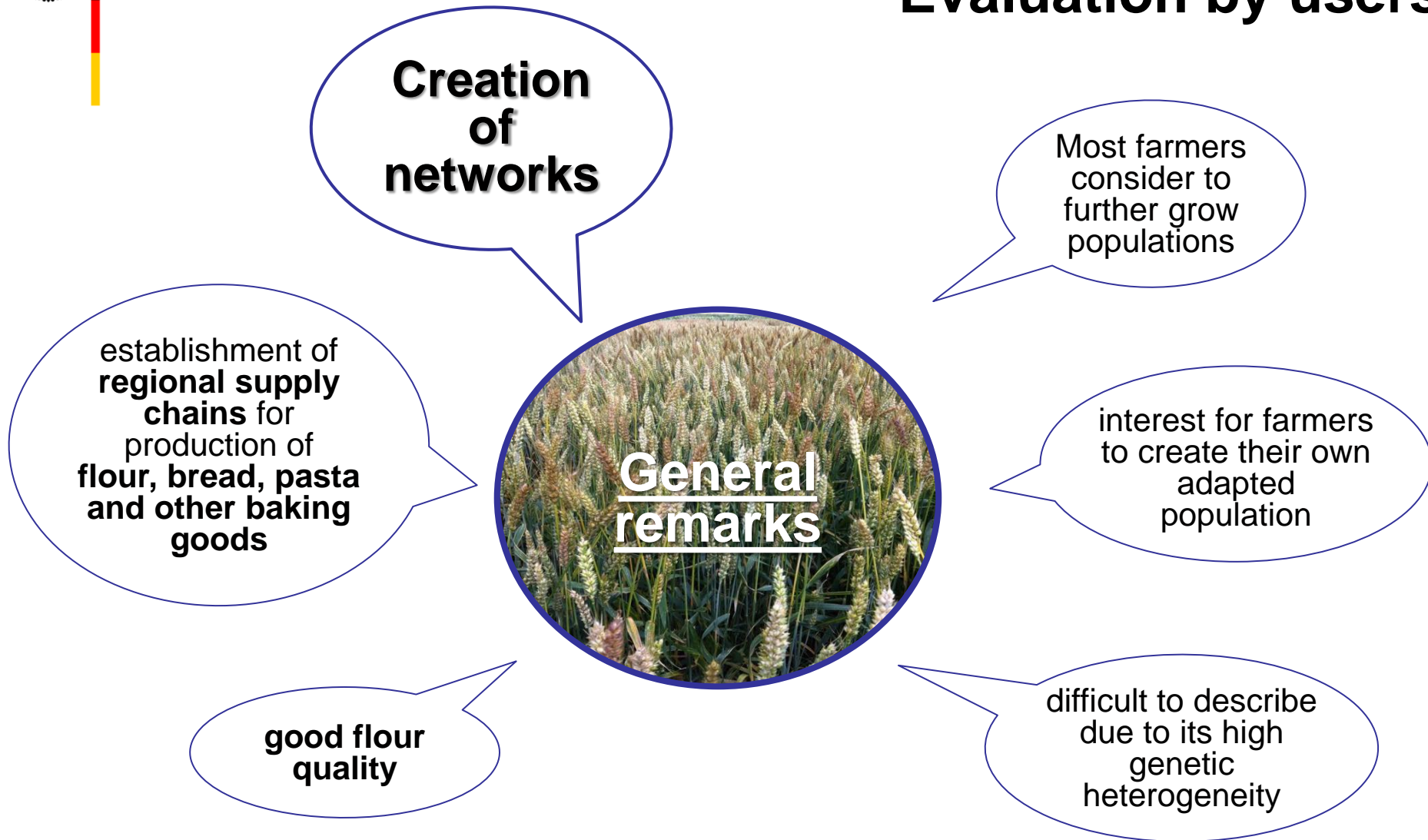


Evaluation by users





Evaluation by users





Conclusions

“Temporary experiment providing for certain derogations for the marketing of populations of the plant species wheat, barley, oats and maize”

(Decision 2014/150/EU)

Field inspections for populations

- can only focus on health status, general crop appearance, contamination with other species and minimum distance to other crops

Identification of populations

- cannot be ascertained by regular field inspection and post control
- to ensure seed identity of populations, traceability requirements must be specified and a control system must be in place



Conclusions

“Temporary experiment providing for certain derogations for the marketing of populations of the plant species wheat, barley, oats and maize”

(Decision 2014/150/EU)

Performance of populations

- lower yielding - specifically for maize - revealed by comparative field trials
- higher susceptibility to pests and diseases revealed by comparative field trials
- variation observed between populations in regards to yield and susceptibility to pests and diseases – population specific conclusions need to be drawn

Key factor

- concept of populations worked best when networks and supply chains were developed simultaneously (e.g. wheat populations)





Thank you !

