Genetic Gain in Winter Oilseed Rape in Europe during last three decades

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Norddeutsche Pflanzenzucht Hans-Georg Lembke KG
Germany

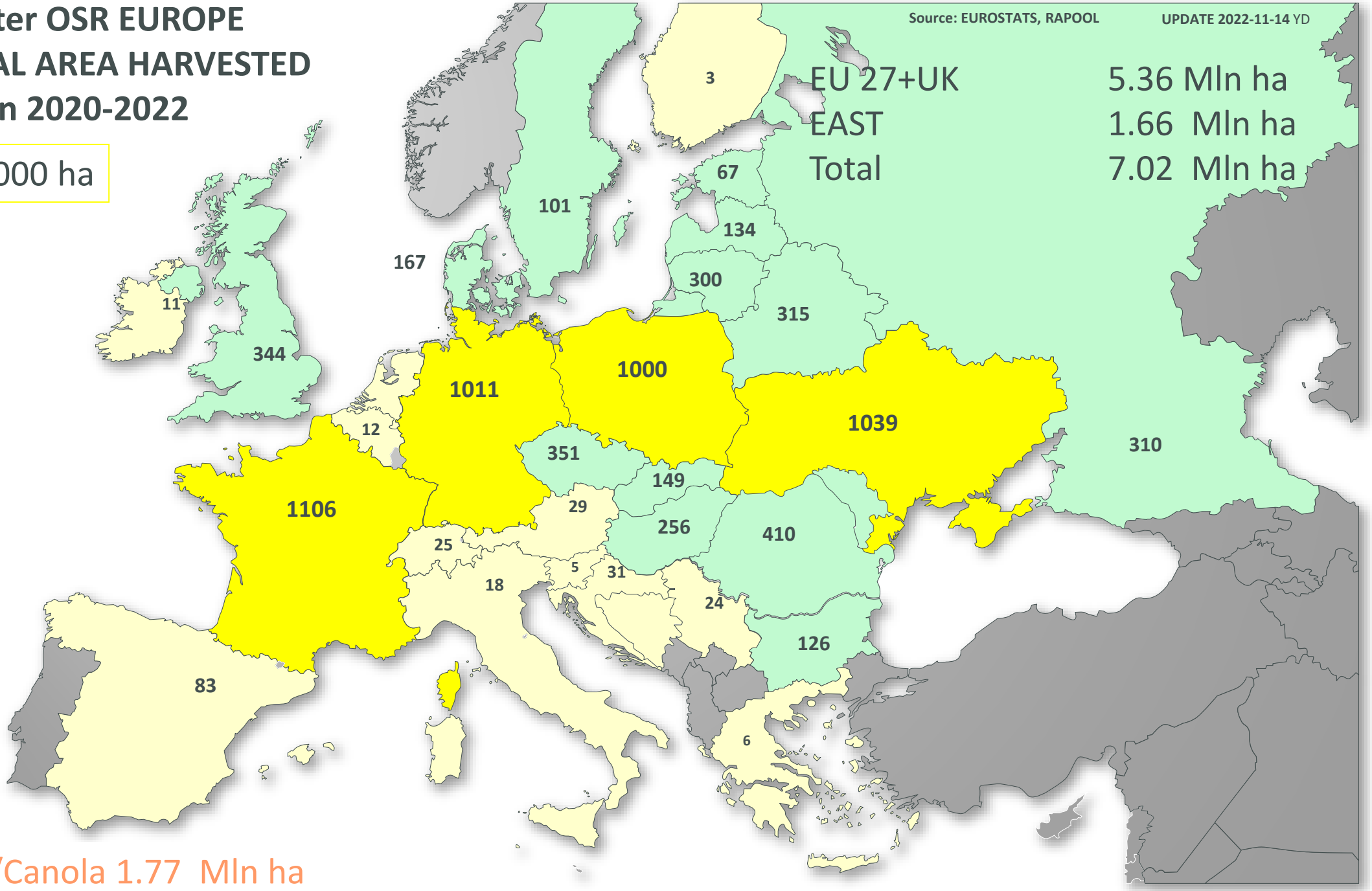
Norddeutsche Pflanzenzucht
Wir lassen Qualität wachsen.

Agenda

- WOSR Production in Europe: Acreage, Yields (dt/ha)
- Longterm Trend Analysis of Yield in different Countries
- Hybrids vs. OP Varieties
- Quality Traits (Oil, Protein, Glucosinolates)
- Disease Resistances (Phoma, Light Leaf Spot, Clubroot, TuYV)
- Winterhardiness
- Nitrogen Use Efficiency
- Final Conclusion

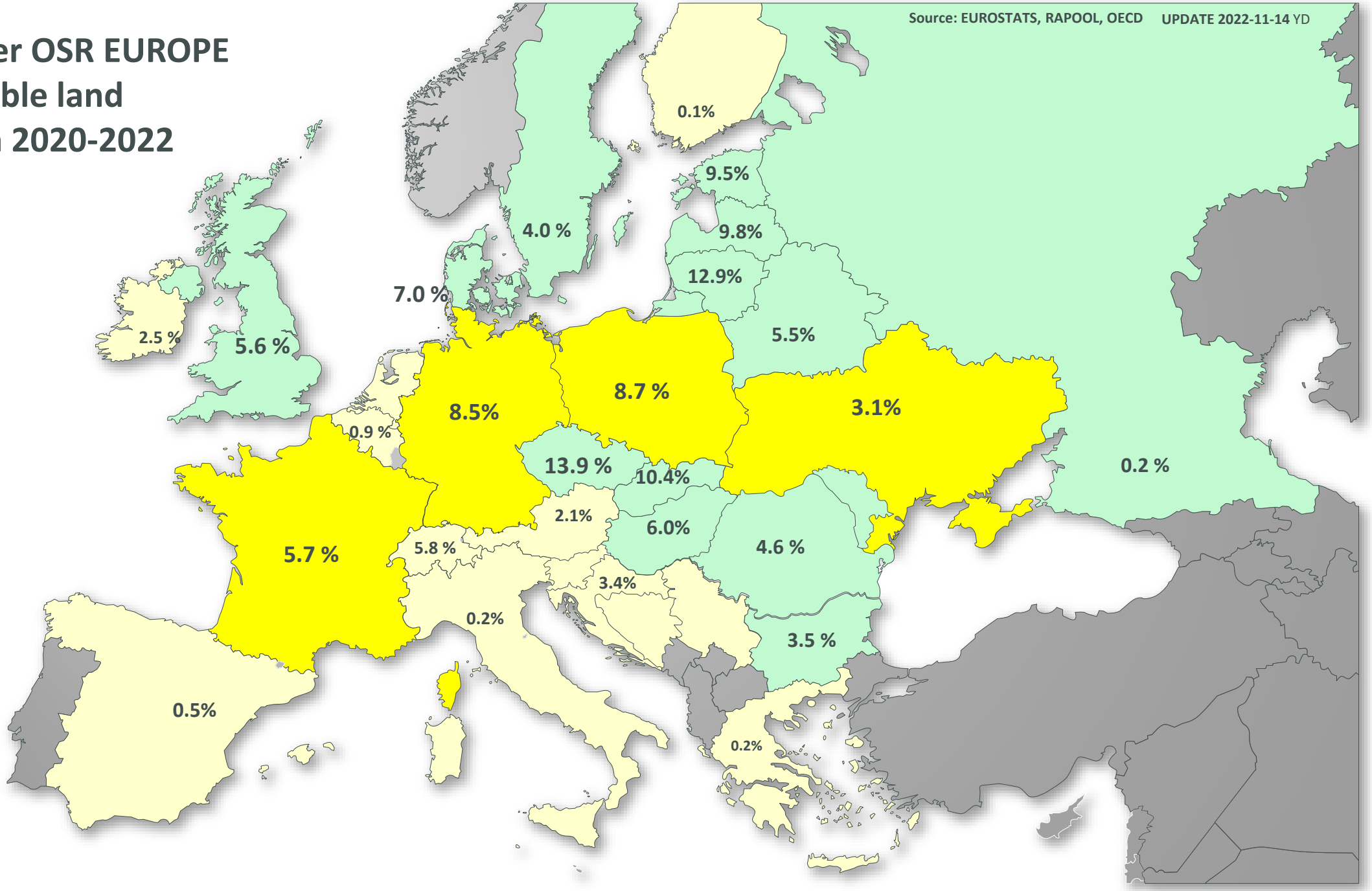
Winter OSR EUROPE
TOTAL AREA HARVESTED
mean 2020-2022

in .000 ha



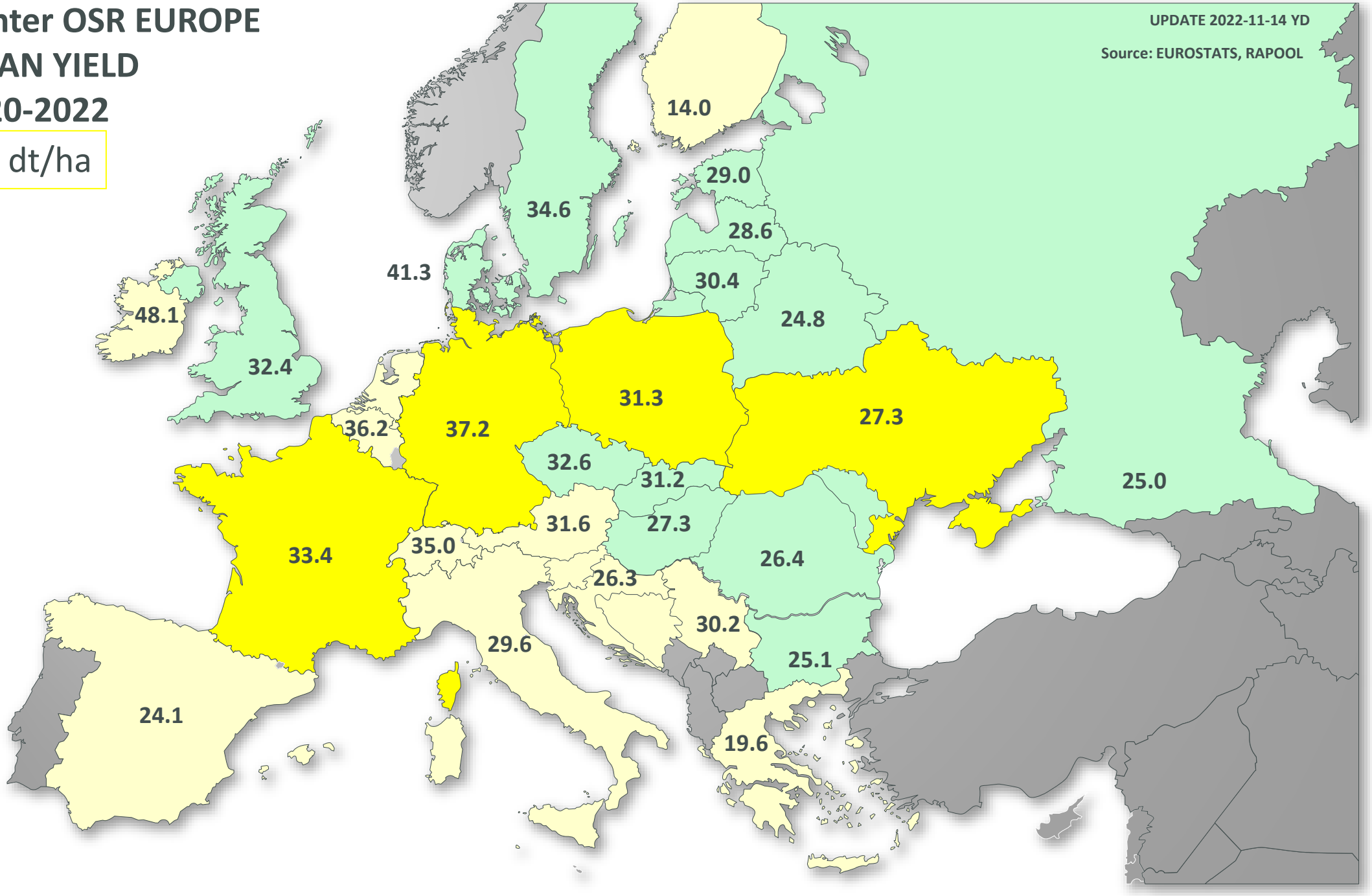
+ SOSR/Canola 1.77 Mln ha

Winter OSR EUROPE
% arable land
mean 2020-2022

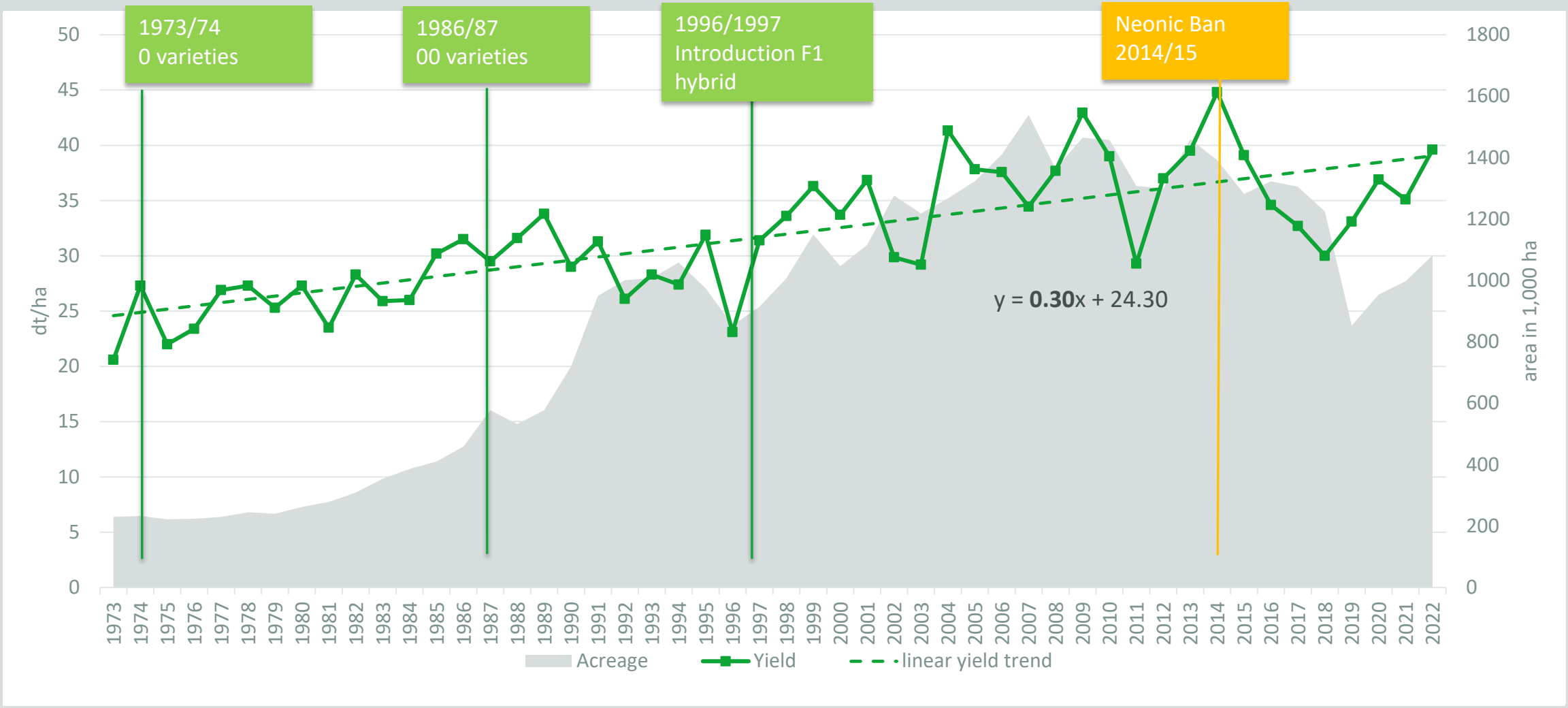


Winter OSR EUROPE
MEAN YIELD
2020-2022

in dt/ha

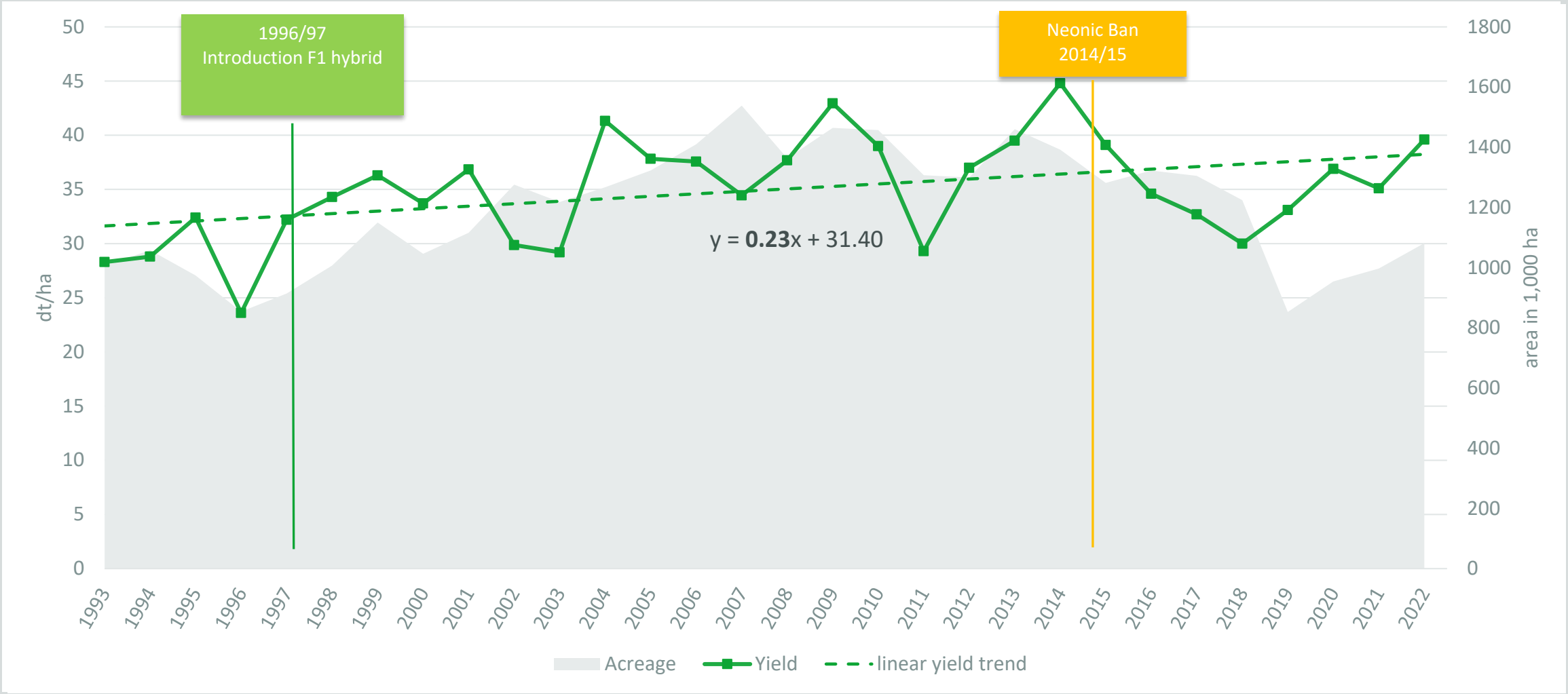


50 Years WOSR Development in Germany



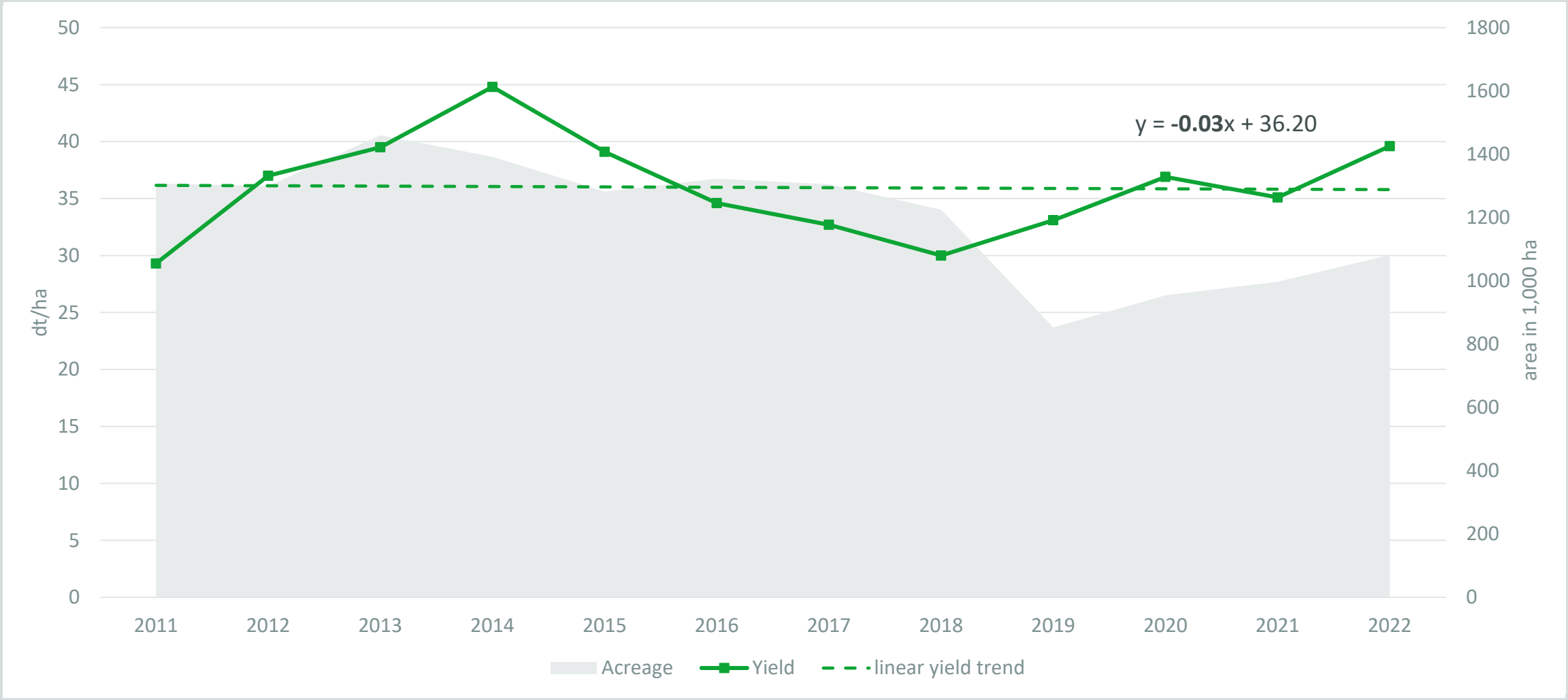
Source: Destatis, Eurostat

30 Years WOSR in Germany: 1993-2022



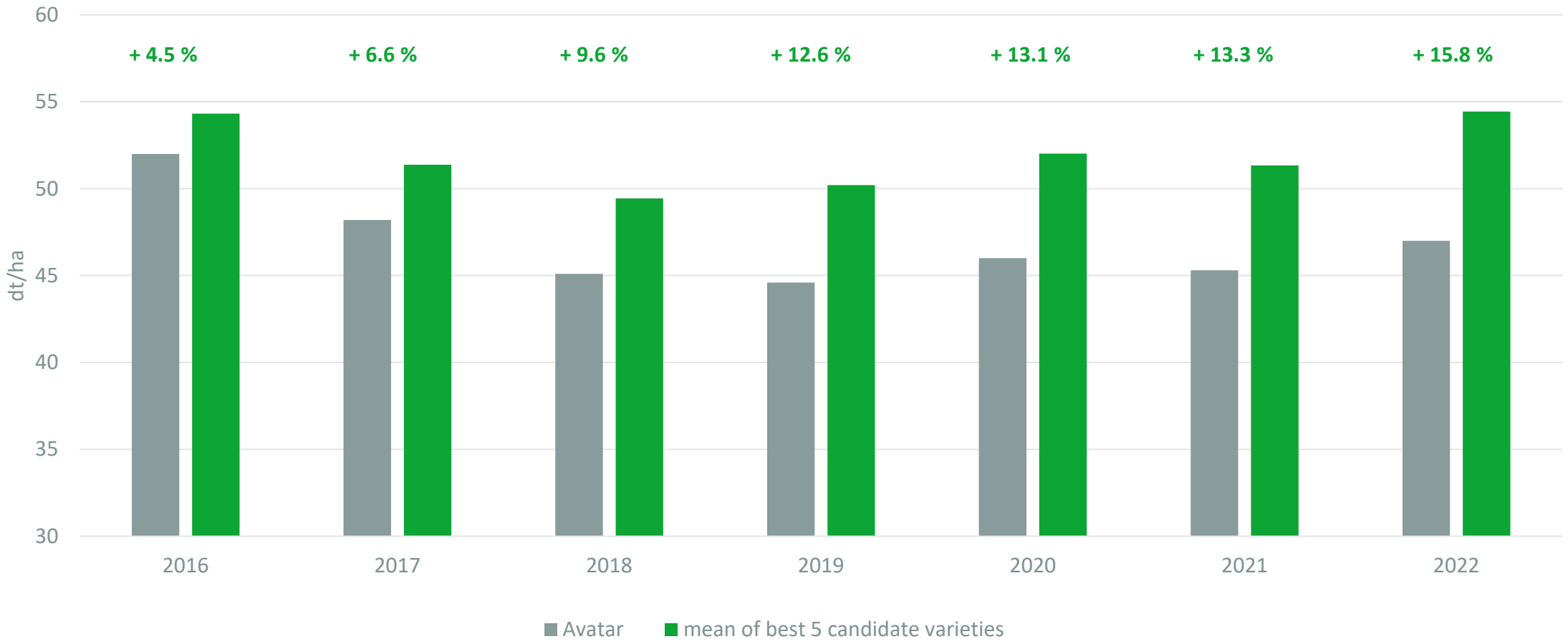
Source: Destatis, Eurostat

12 Years WOSR in Germany: 2011-2022



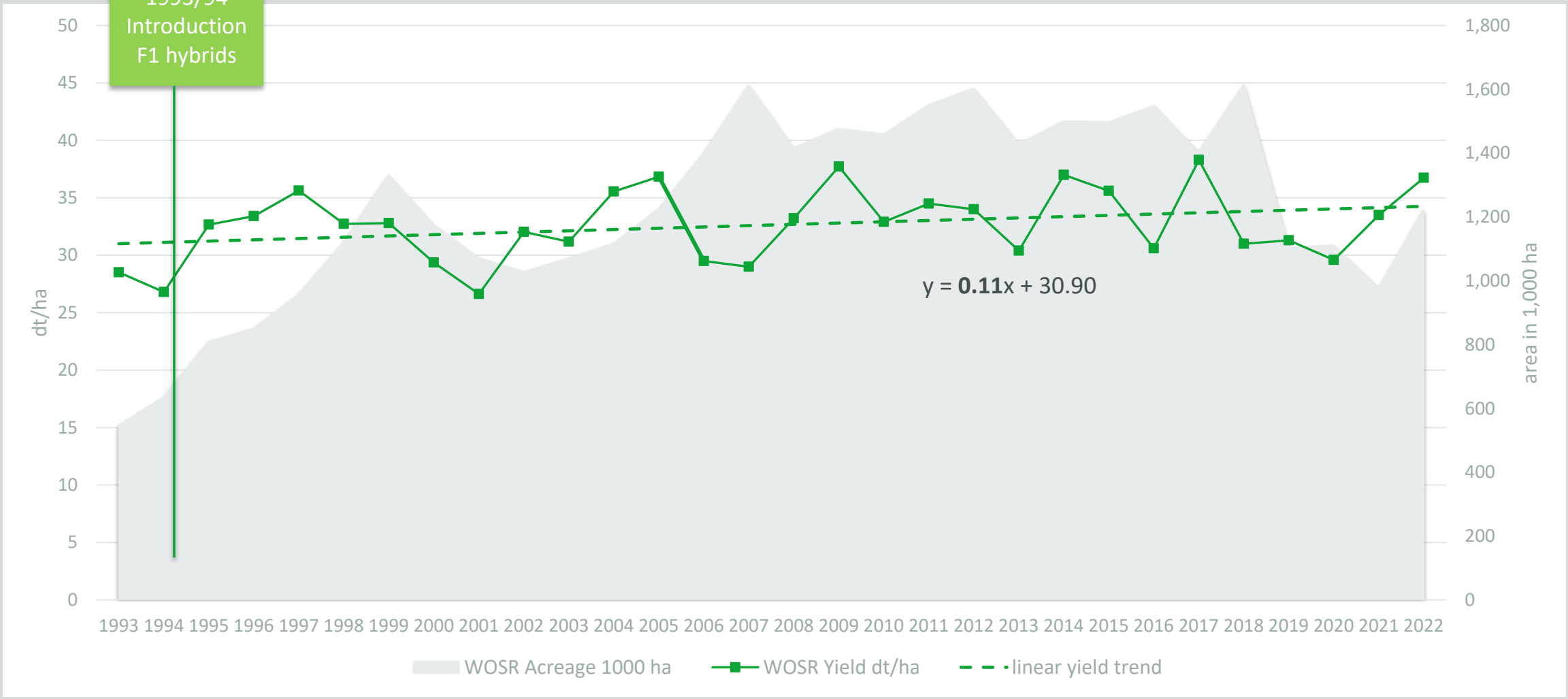
Source: Destatis, Eurostat

Genetic Gain of new Varieties compared to Check Variety Avatar



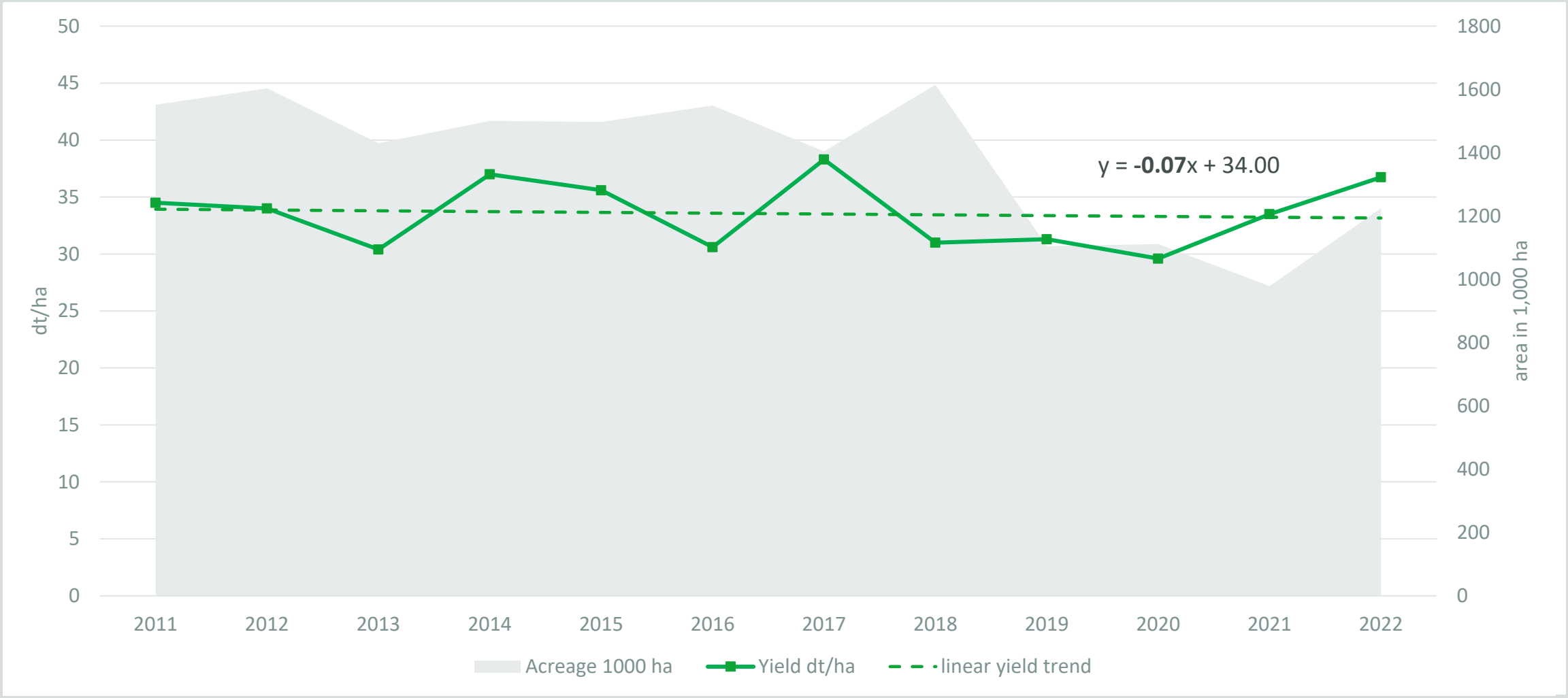
Source: official results NL trials Bundessortenamt, Germany (2016-2022)

30 Years WOSR in France: 1993-2022



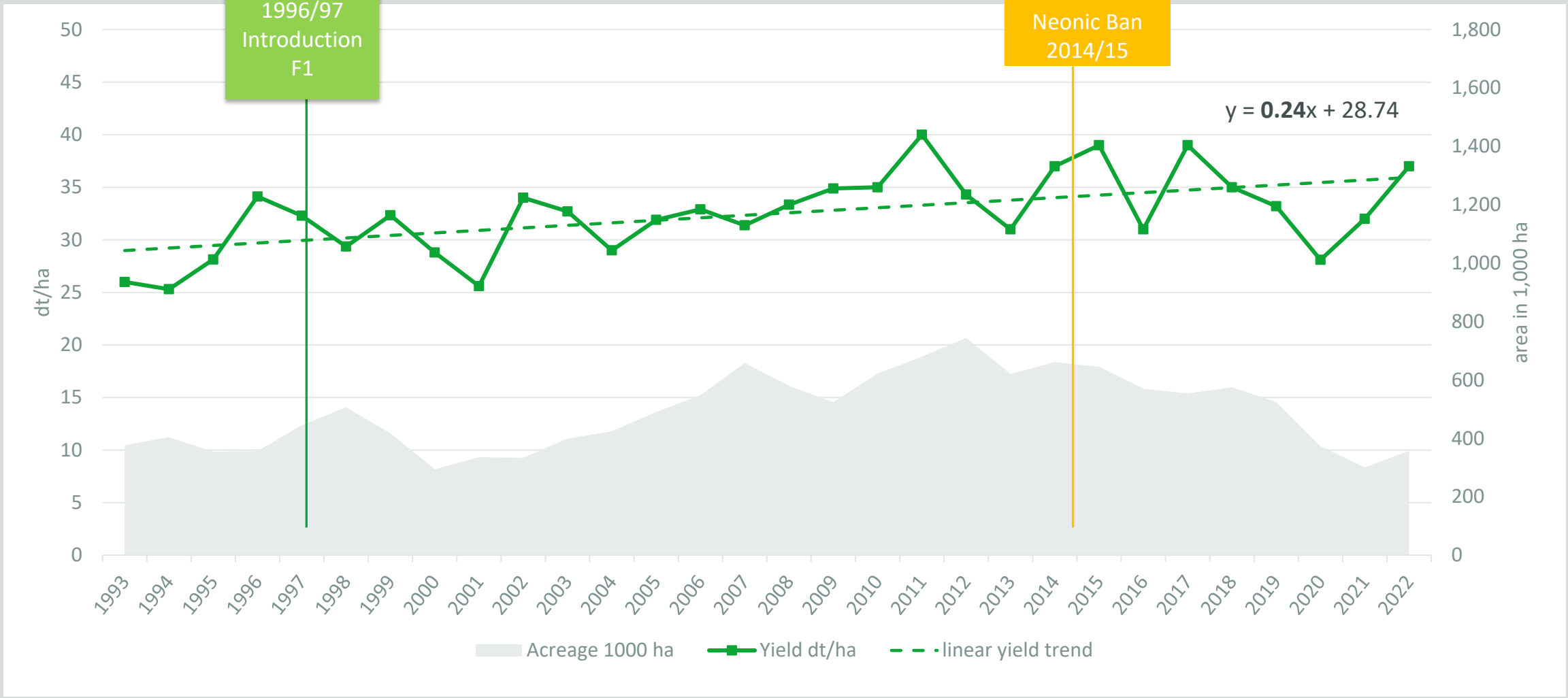
https://ec.europa.eu/eurostat/web/agriculture/data/database

12 Years WOSR in France: 2011-2022



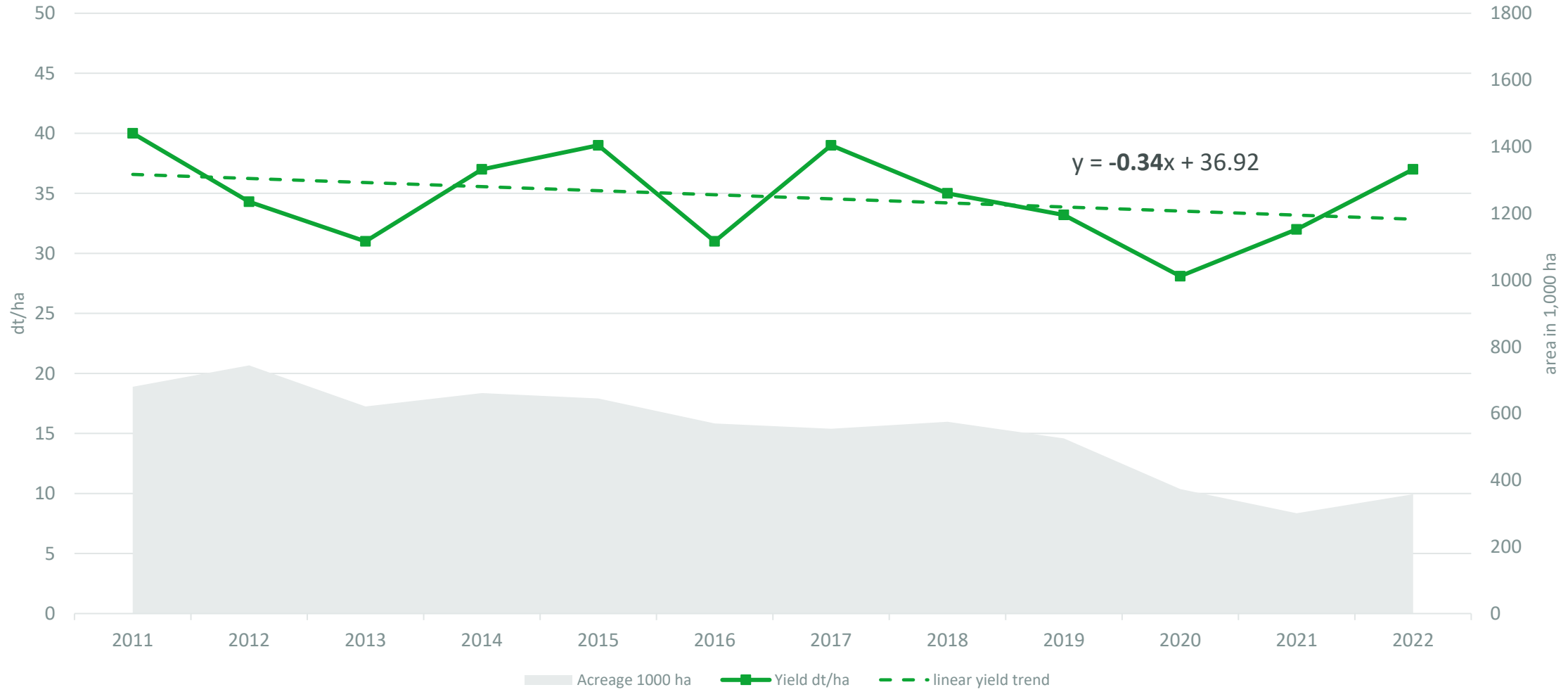
https://ec.europa.eu/eurostat/web/agriculture/data/database

30 Years WOSR in UK: 1993-2022



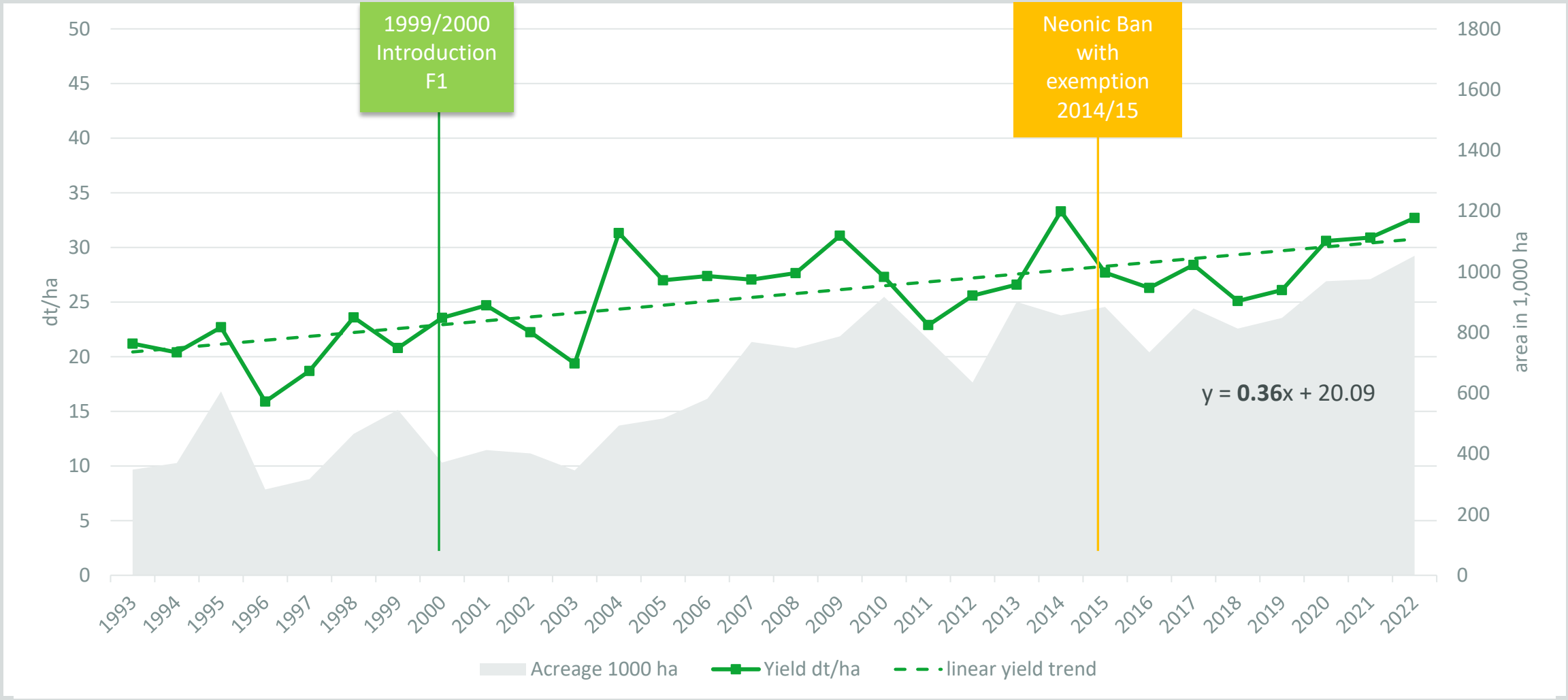
https://www.gov.uk/government/statistical-data-sets/agriculture-in-the-united-kingdom
June DEFRA Census _England Crop Areas

12 Years WOSR in UK 2011-2022



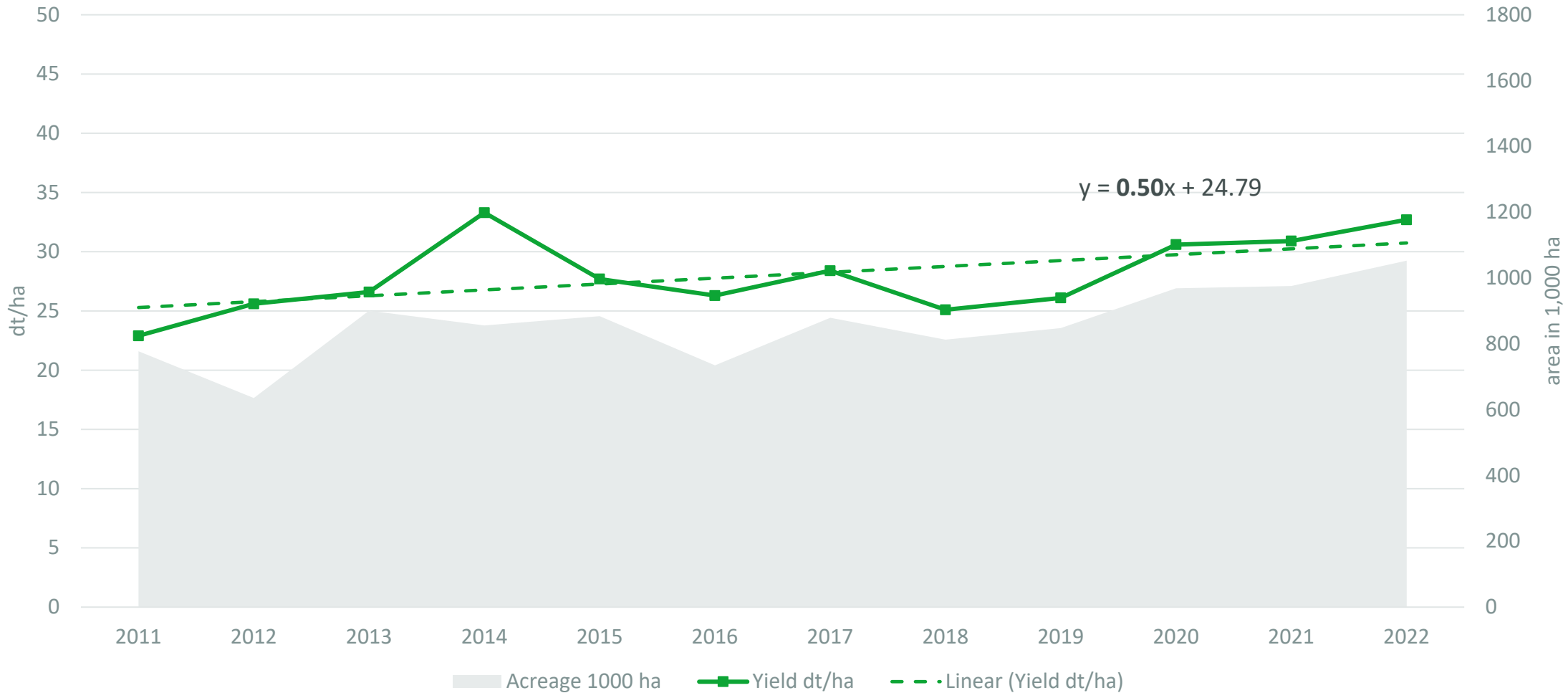
https://www.gov.uk/government/statistical-data-sets/agriculture-in-the-united-kingdom
June DEFRA Census _England Crop Areas

30 Years WOSR in Poland: 1993-2022



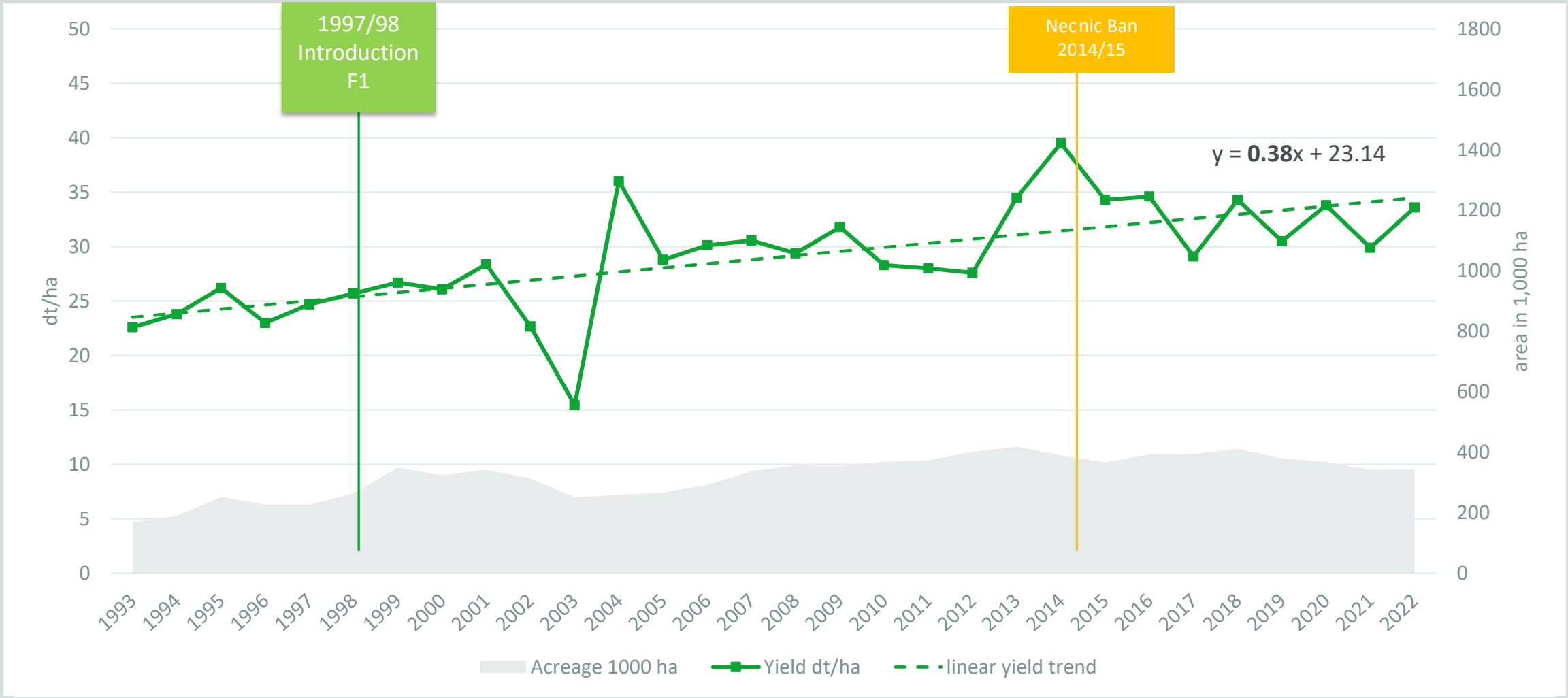
https://ec.europa.eu/eurostat/web/agriculture/data/database
Source: Statistical Yearbook of the Republic of Poland (1995, 2998, 2000, 2004)

12 Years WOSR in Poland: 2011-2022



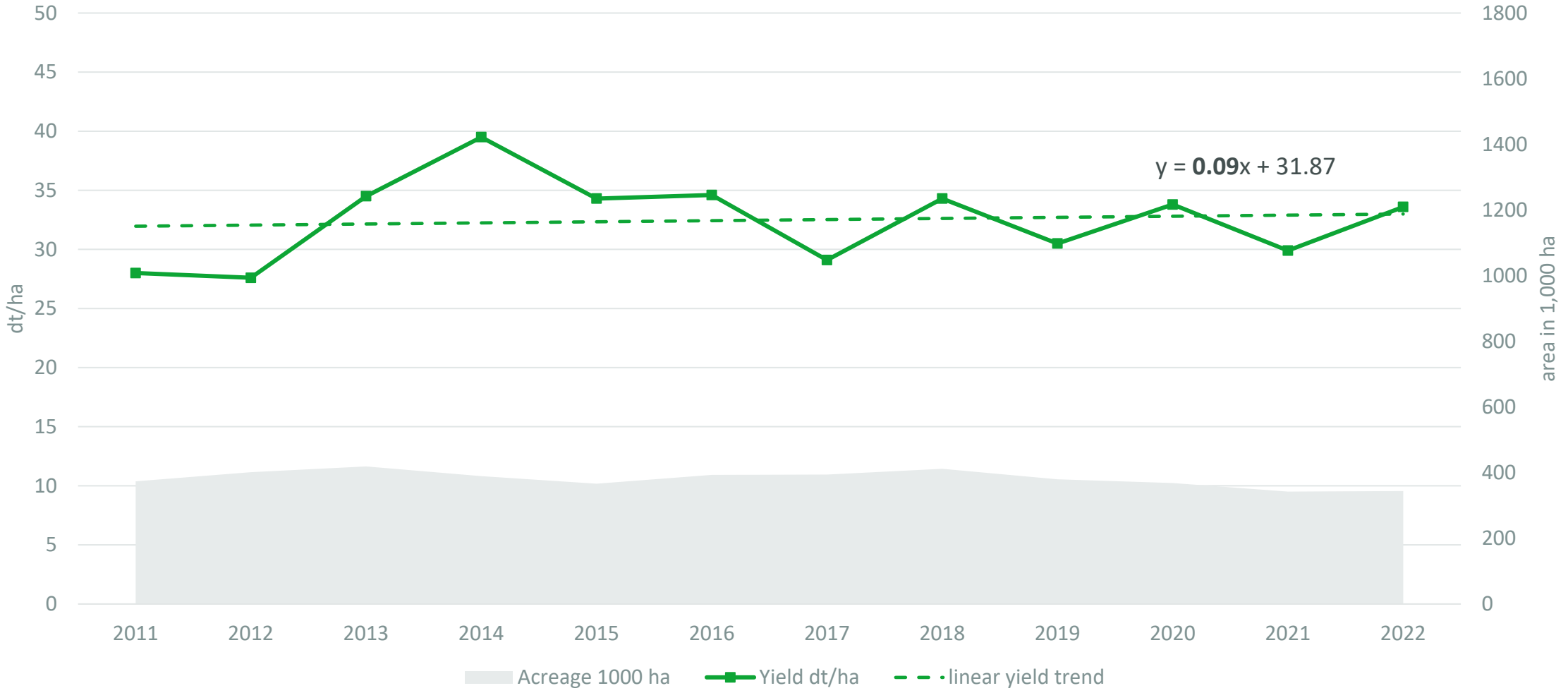
https://ec.europa.eu/eurostat/web/agriculture/data/database

30 Years WOSR in Czech Republic: 1993-2022



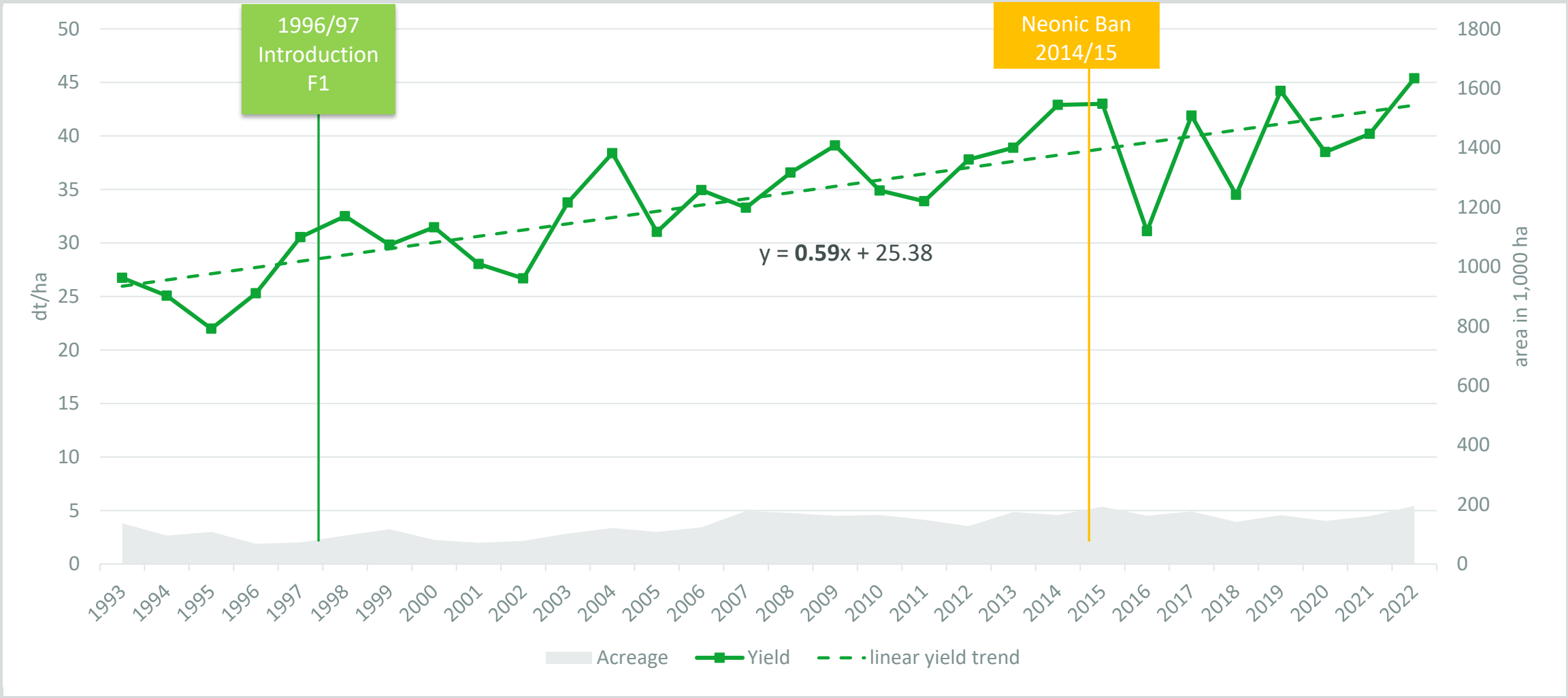
https://ec.europa.eu/eurostat/web/agriculture/data/database

12 Years WOSR in Czech Republic: 2011-2022



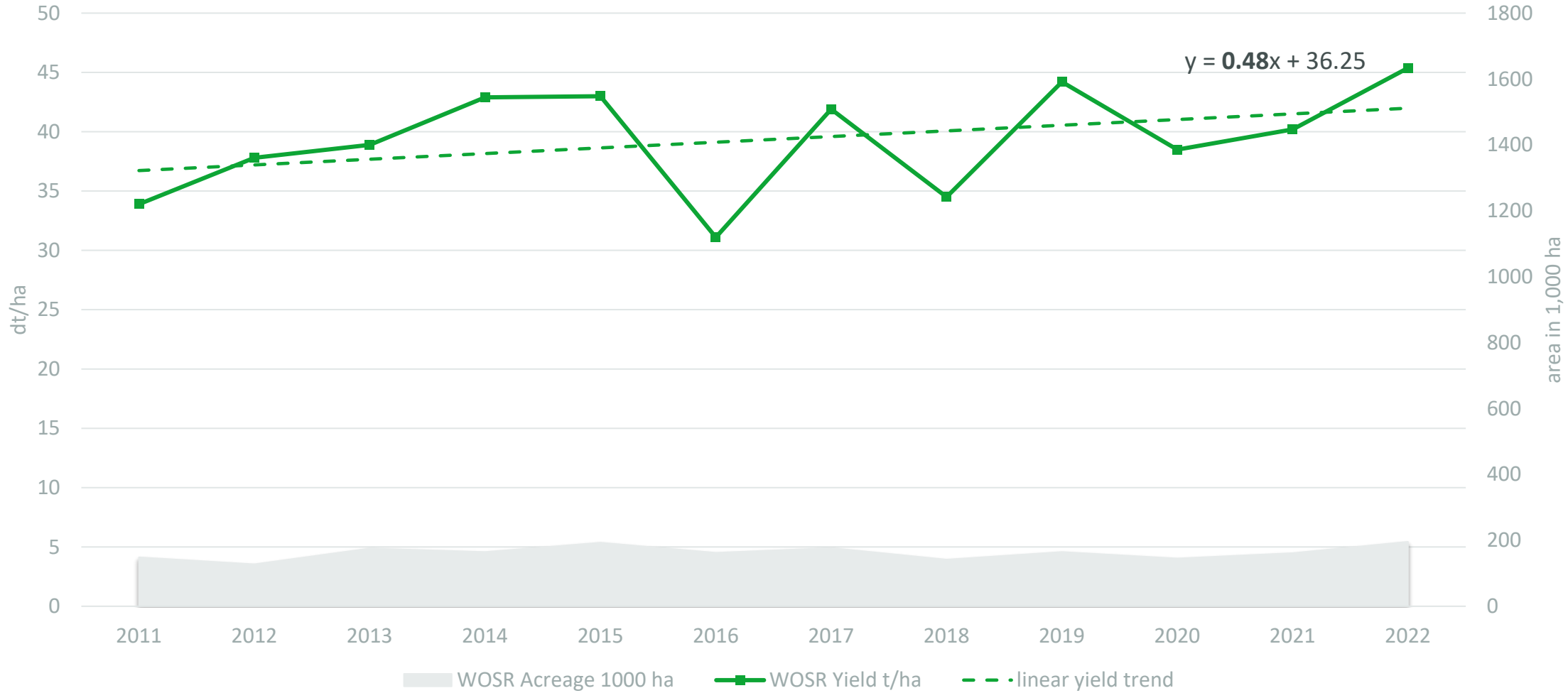
https://ec.europa.eu/eurostat/web/agriculture/data/database

30 Years WOSR in Denmark: 1993-2022



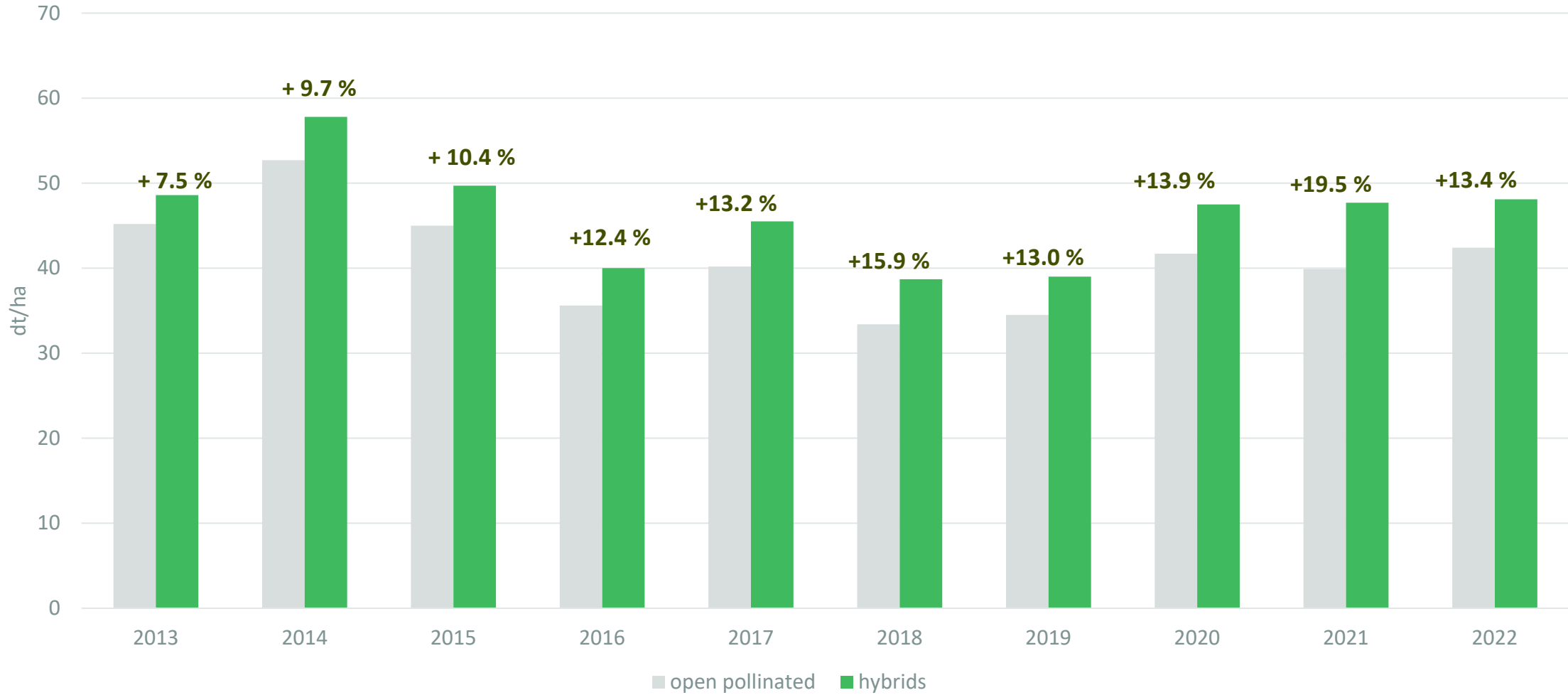
Source: https://ec.europa.eu/eurostat/web/agriculture/data/database

12 Years WOSR in Denmark: 2011-2022



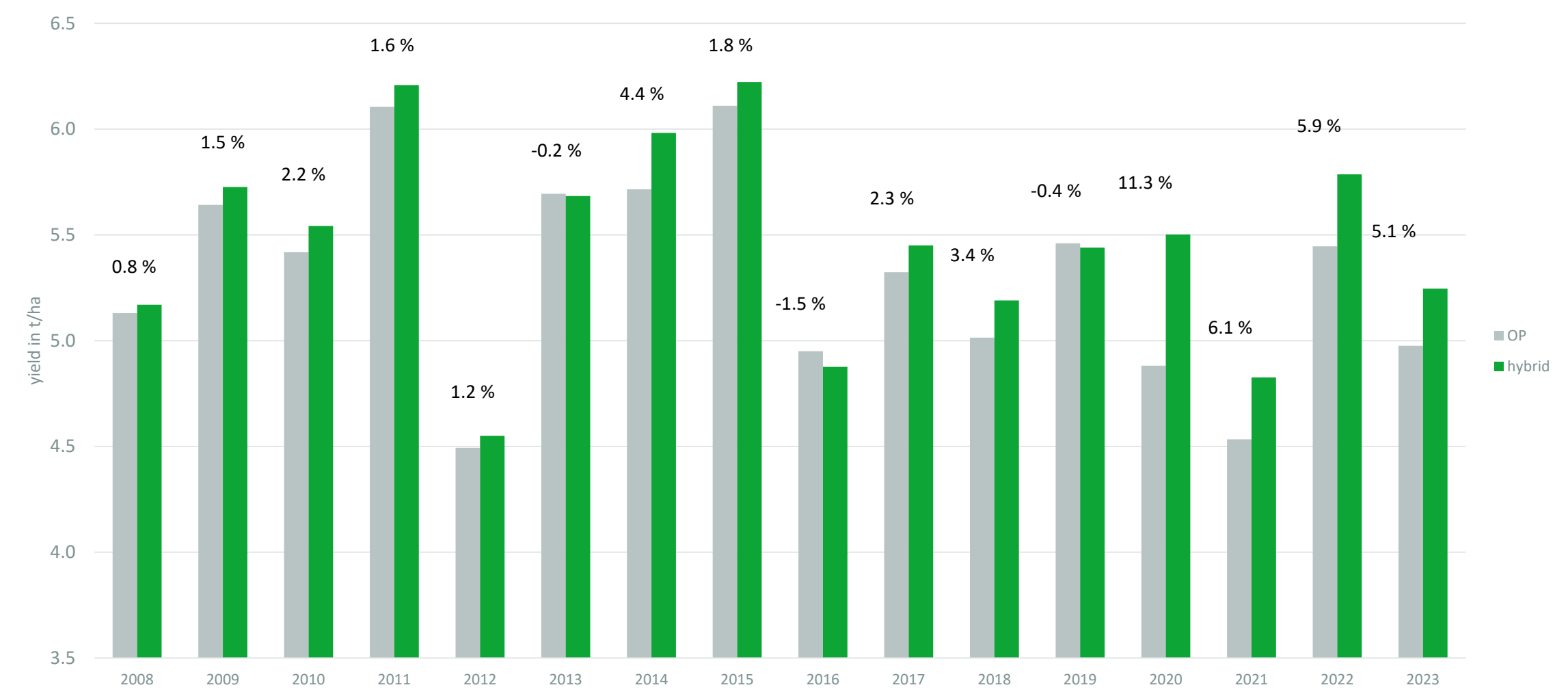
Source: https://ec.europa.eu/eurostat/web/agriculture/data/database

Poland: Seed yield of F1 hybrids vs. OP varieties



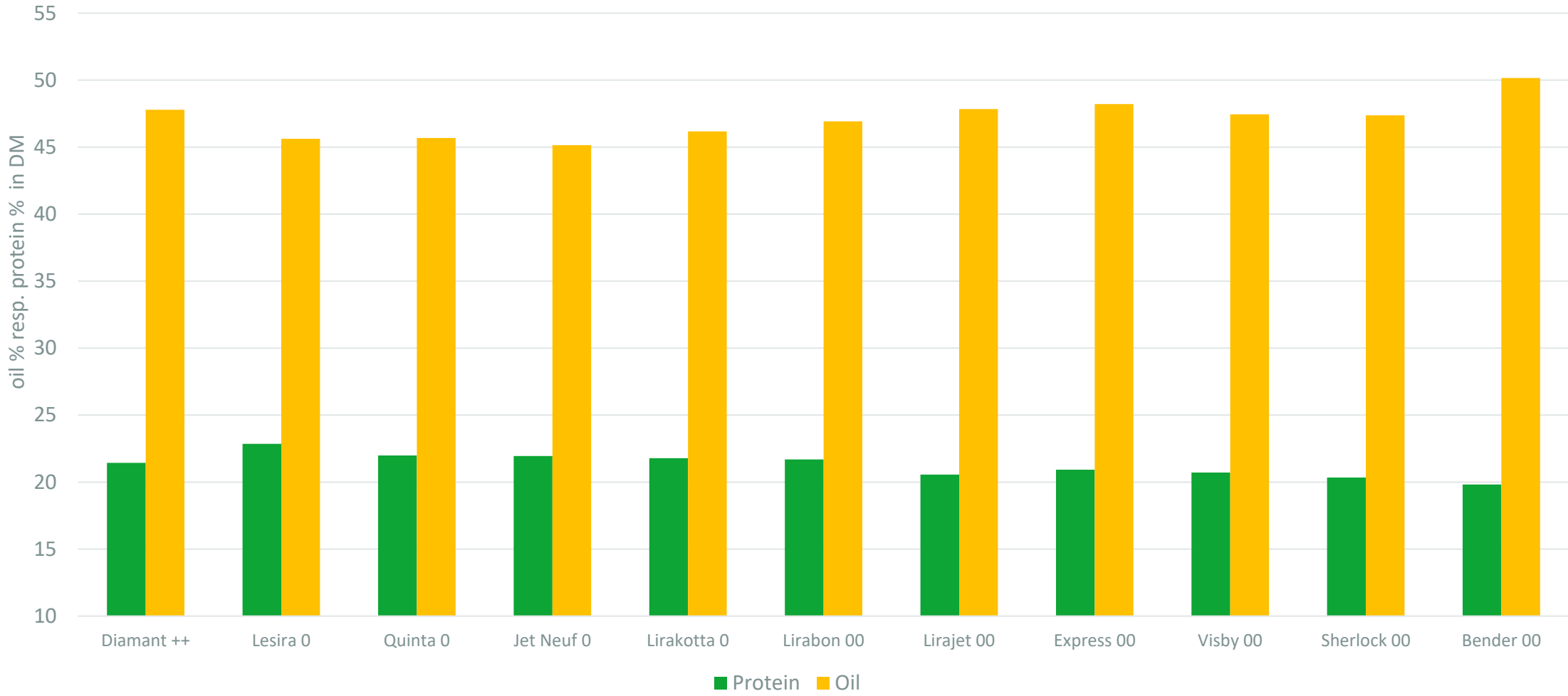
Source: PDO trials (2013-2022)

UK (EW): Seed yield comparison of F1 hybrids vs. OP varieties



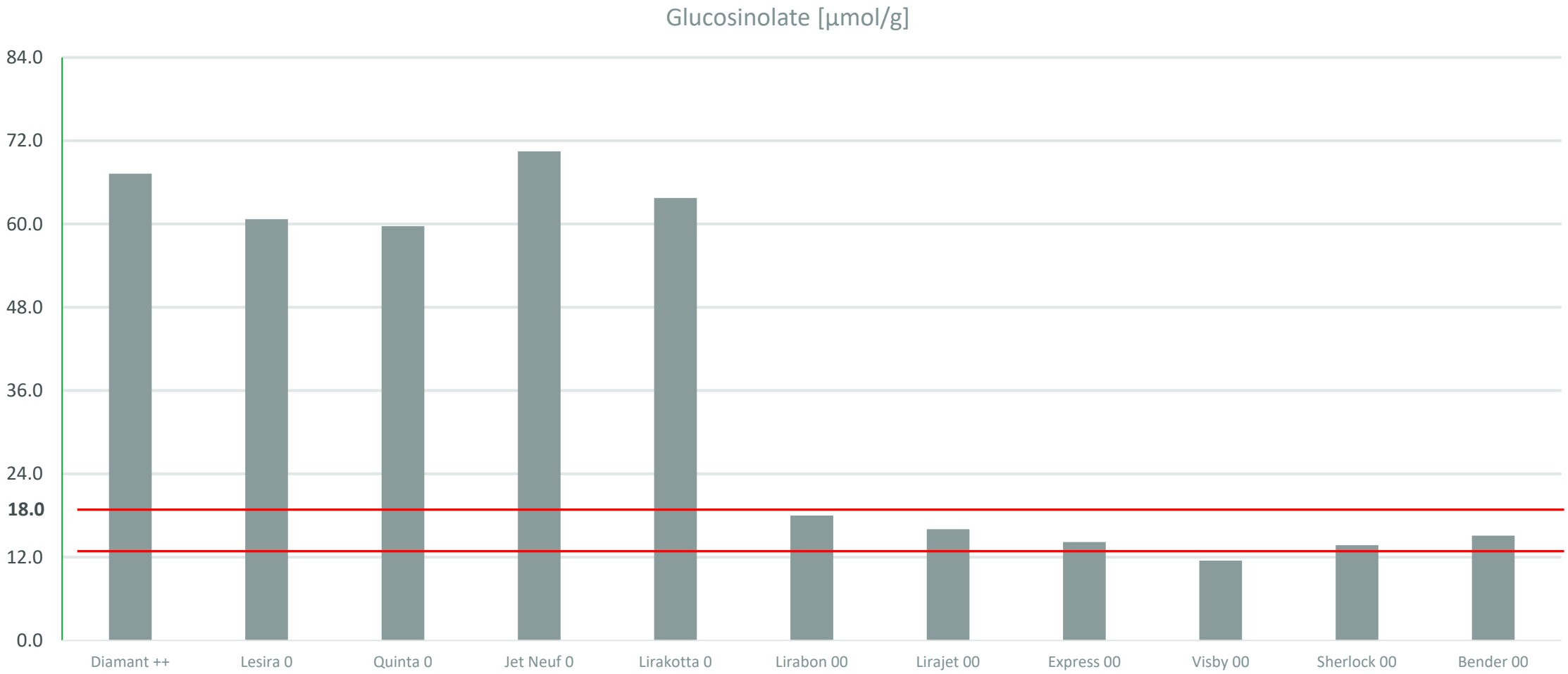
source: C. Padley after official UK AHDB RL; 5 best varieties each group

Oil and Protein Content in Old and New Varieties



source: Stemann et al. (2019): Feldversuche der Fachhochschule Südwestfalen zum Zuchtfortschritt in Raps

Glucosinolate Content in Old and New Varieties



source: Stemann et al. (2019): Feldversuche der Fachhochschule Südwestfalen zum Zuchtfortschritt in Raps

Phoma resistance scoring in France based on CTPS protocol

- Special blackleg test: scoring of stem cross section

▲ inoculum: stubbles

◂ moistening

▲ inoculation

◂ sampling

▲ scoring

Source: CTPS, France

CTPS - FRANCE - PHOMA / G2 Notation

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Average
Nb Trials	4	9	6	9	11	8	4	5	5	5	5	last 3 Years
EUROL	3.60	3.00	4.05	4.49	4.12	4.09	4.20	4.60	5.58	4.82	6.88	5.76
FALCON	3.84	3.20	4.09	4.99	4.65	5.57	4.32	5.32	5.40	5.82	6.15	5.79
JET NEUF		1.60	2.33	1.88	2.19	2.23	1.53	2.23	3.50	3.24	3.90	3.55
DK EXSTORM			1.21	1.18	1.99	1.41	1.18	1.59	2.04	1.98	2.70	2.24
BERLIOZZ	0.94		1.35	1.15	1.62	1.47	1.39	1.58	1.40	1.36	2.30	1.69
MARCOPOLOS				3.70	3.99	4.25	3.87	3.92	4.95	4.41	5.57	4.98
NAPOLI					1.33	1.05	0.98	1.38	1.20	1.11	1.05	1.12
ES MAMBO		1.10					1.05	1.68	1.41	1.15	1.38	1.31
Average All Varieties	2.92	2.31	2.46	2.61	2.75	2.90	2.53	3.18	3.28	2.88	3.47	3.30

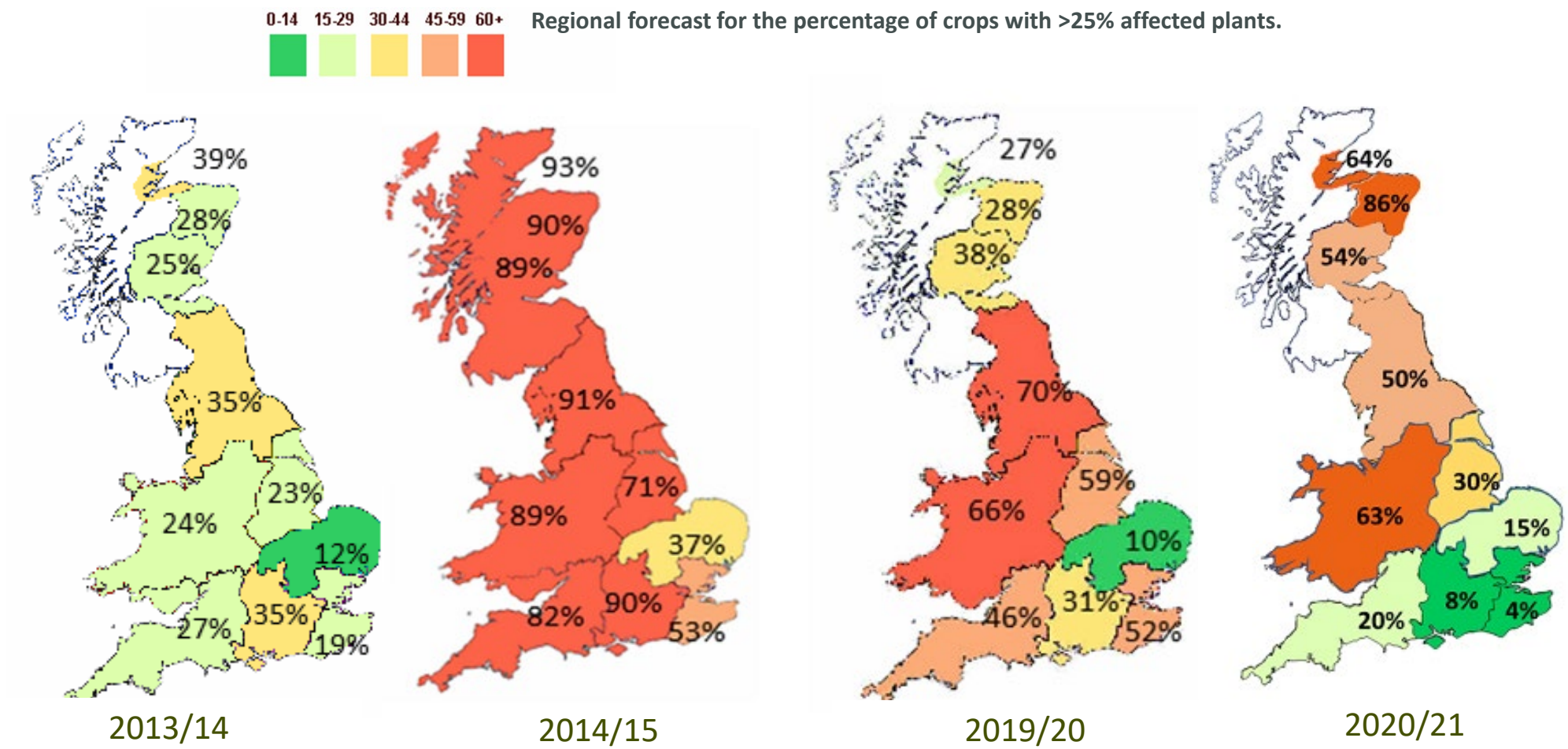
Source: Yves Devisme after CTPS, France

UK: Cylindrosporium – Light Leaf Spot (LLS)

- **Pathogen** *Pyrenopeziza brassicae*
  Cylindrosporium concentricum

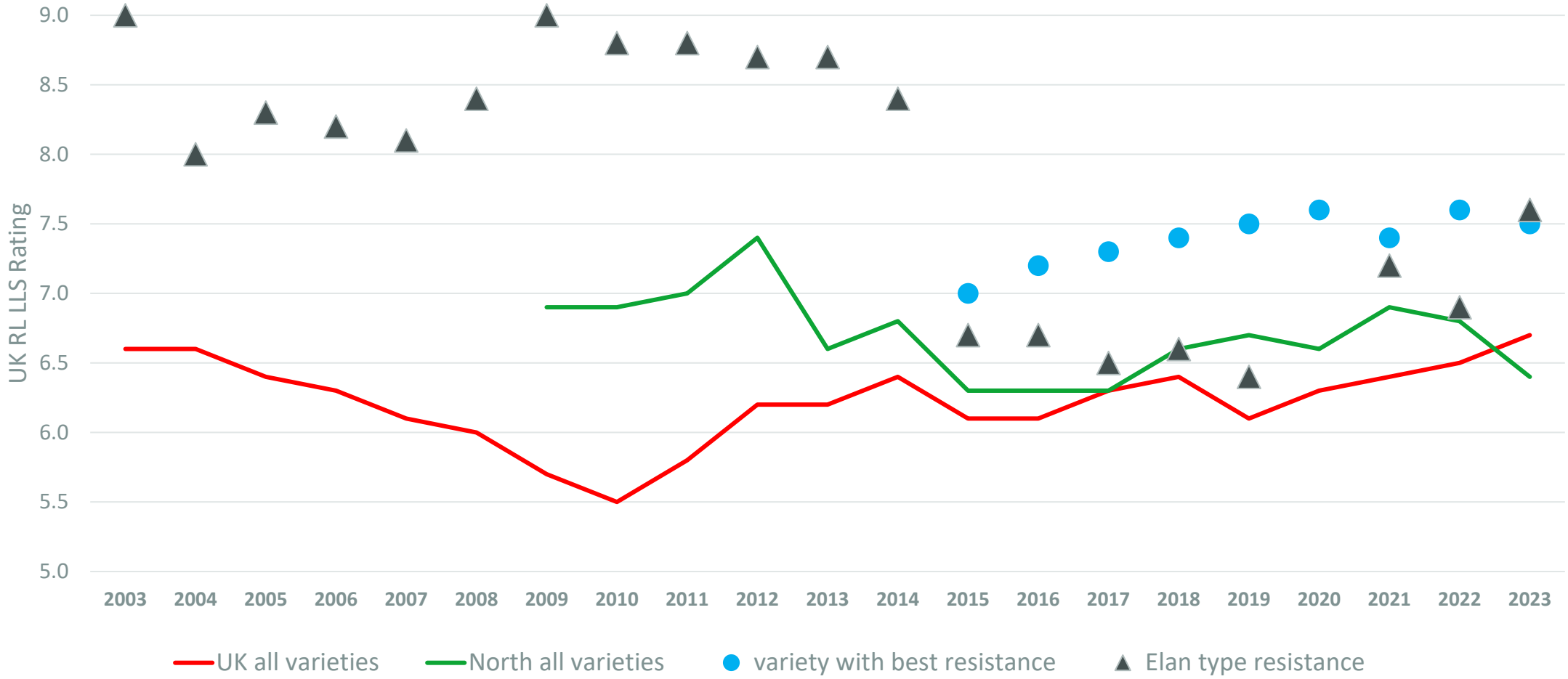
Source: NPZ

UK: Light Leaf Spot Disease Forecast in different years



Source: https://ahdb.org.uk/historic-light-leaf-spot-forecasts-harvest-years-2015-21

LLS resistance ratings in recommended list trials

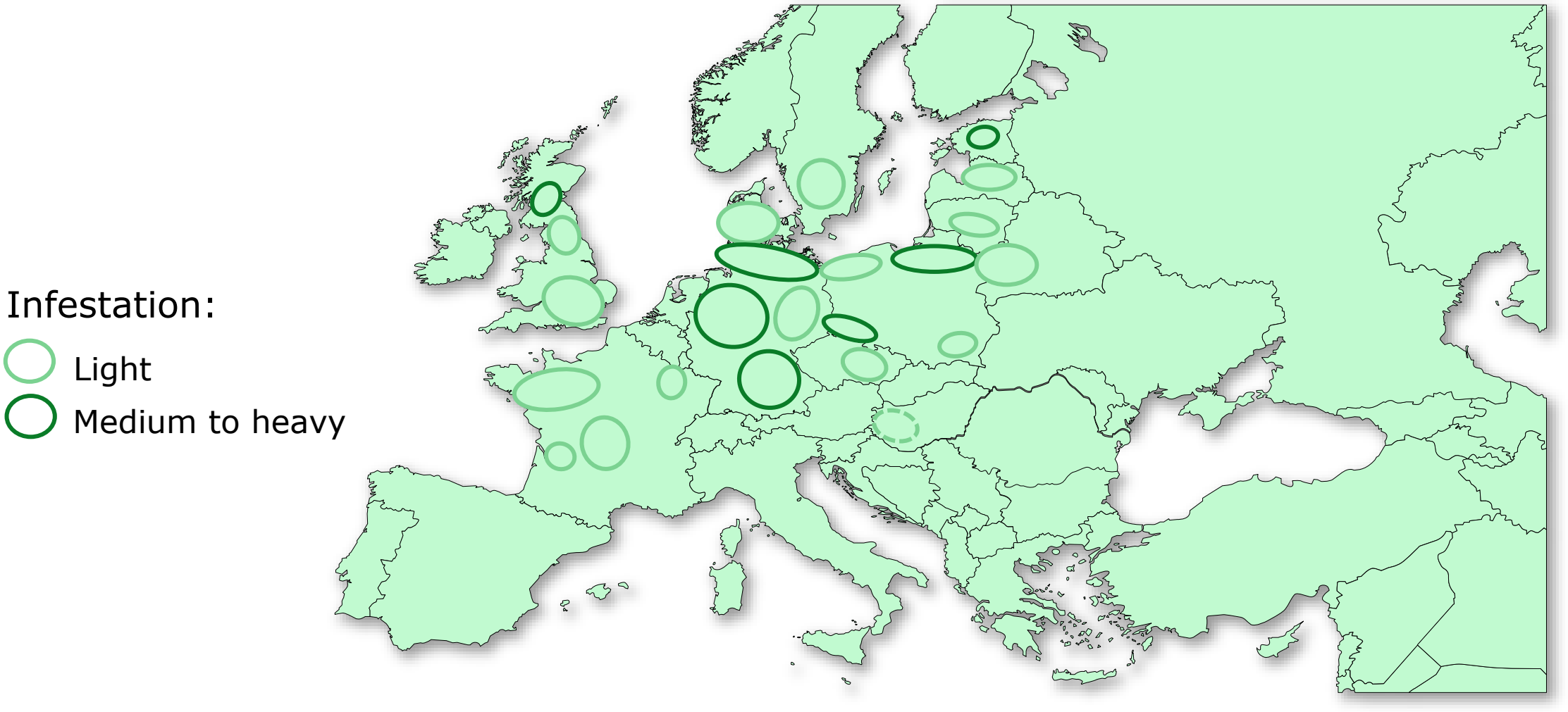


Source: https://ahdb.org.uk; RL trials

Clubroot (*Plasmodiophora brassicae*)

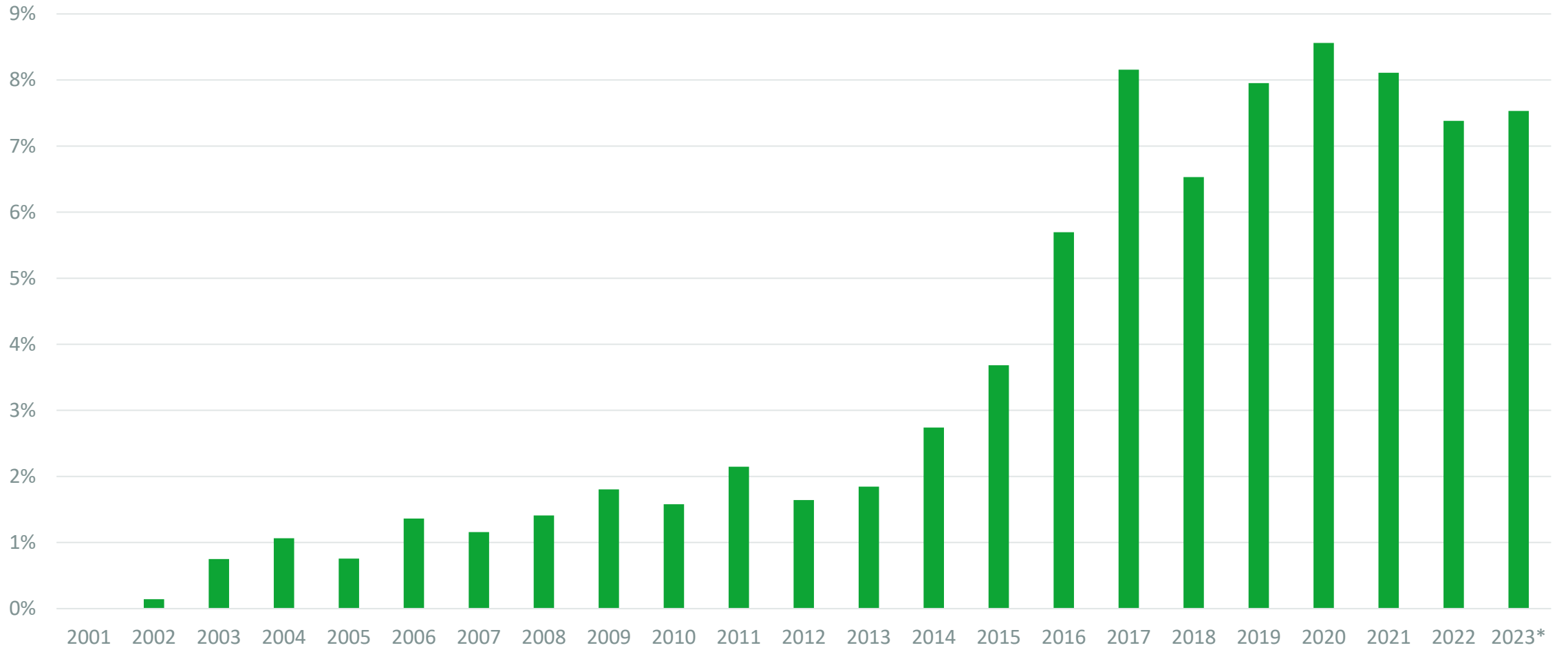
Source: R. Kahl, NPZ

Spreading of Clubroot in Europe



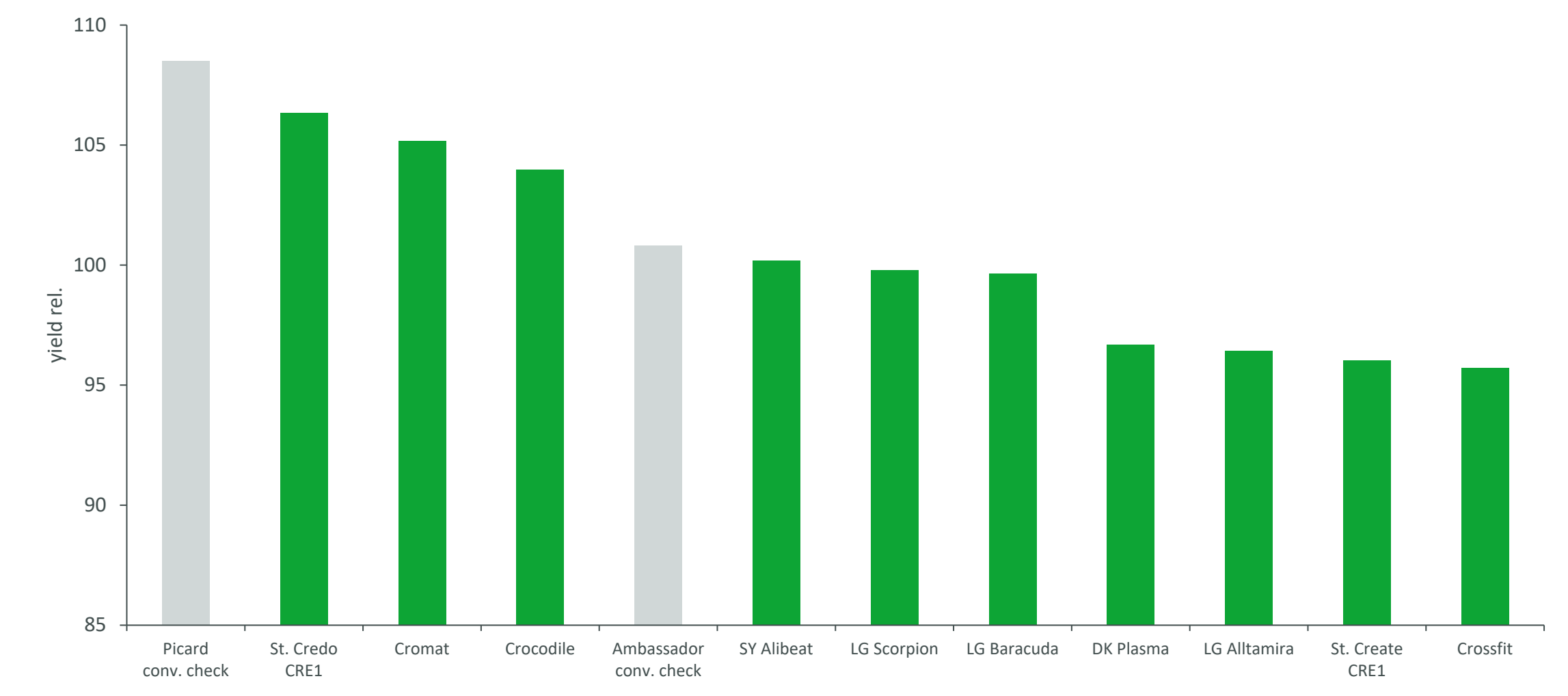
source: Rapool 2017

Market shares of Clubroot resistant (CR) varieties in Germany



source: Glameyer/NPZ 2022 after Kleffmann, Destatis and RAPOOL; *2023 estimated

Yield (relative) of CR varieties, results of 6 sites Northern Germany (2023)

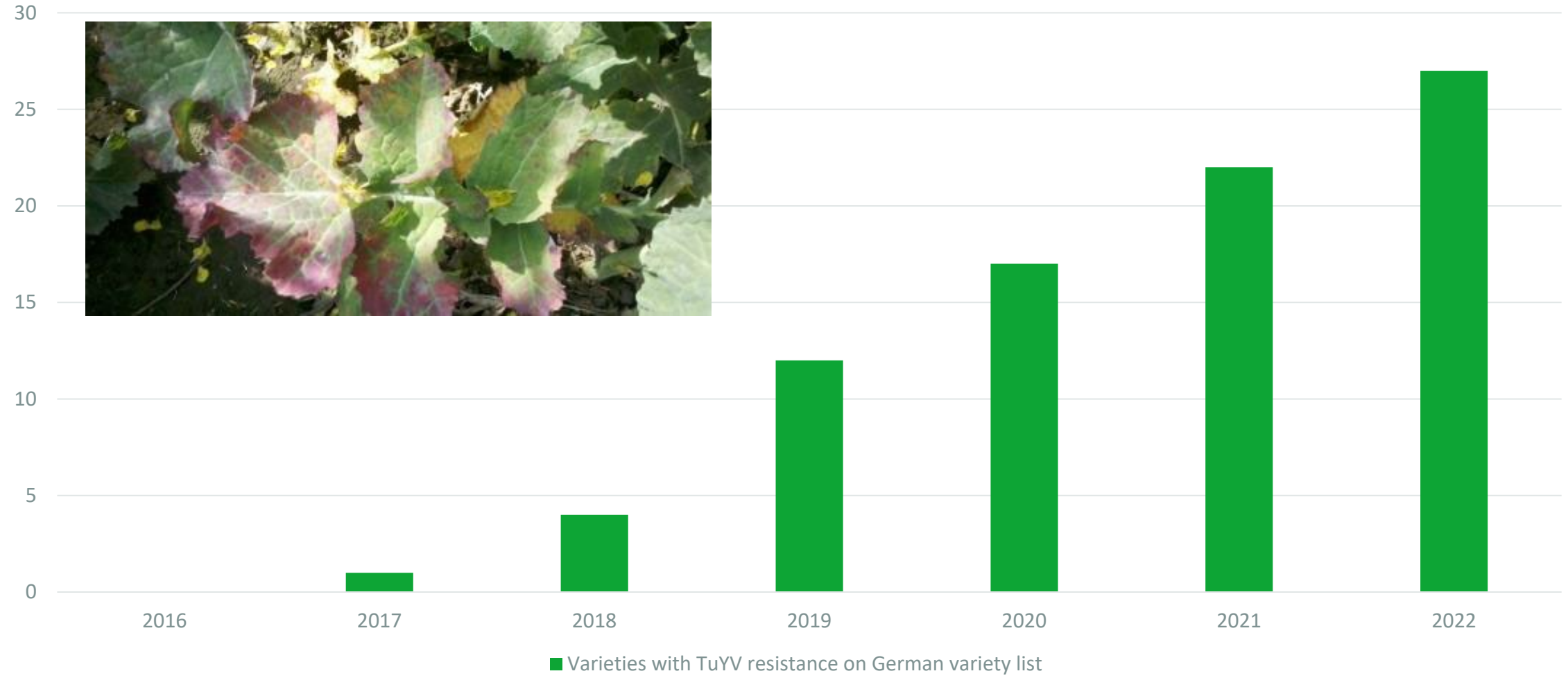


source: LWK SH/ LFA MV 2023, rel. 100 = 47,98 dt/ha; St. = candidate

TuYV transmitted by Aphids (*Myzus persicae*)

Source: R. Kahl, NPZ

No. of TUYV resistant varieties registered on German variety list



Source: Bundessortenamt

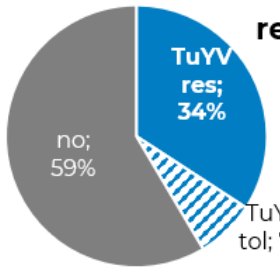
Market shares of TuYV resistant varieties in Europe

TuYV (resistance & tolerance) by countries | 2022

Certified hybrid market

% cultivated area: Certified hybrid market 2022 = 6 793

TuYV tolerance + resistance
Total 2022

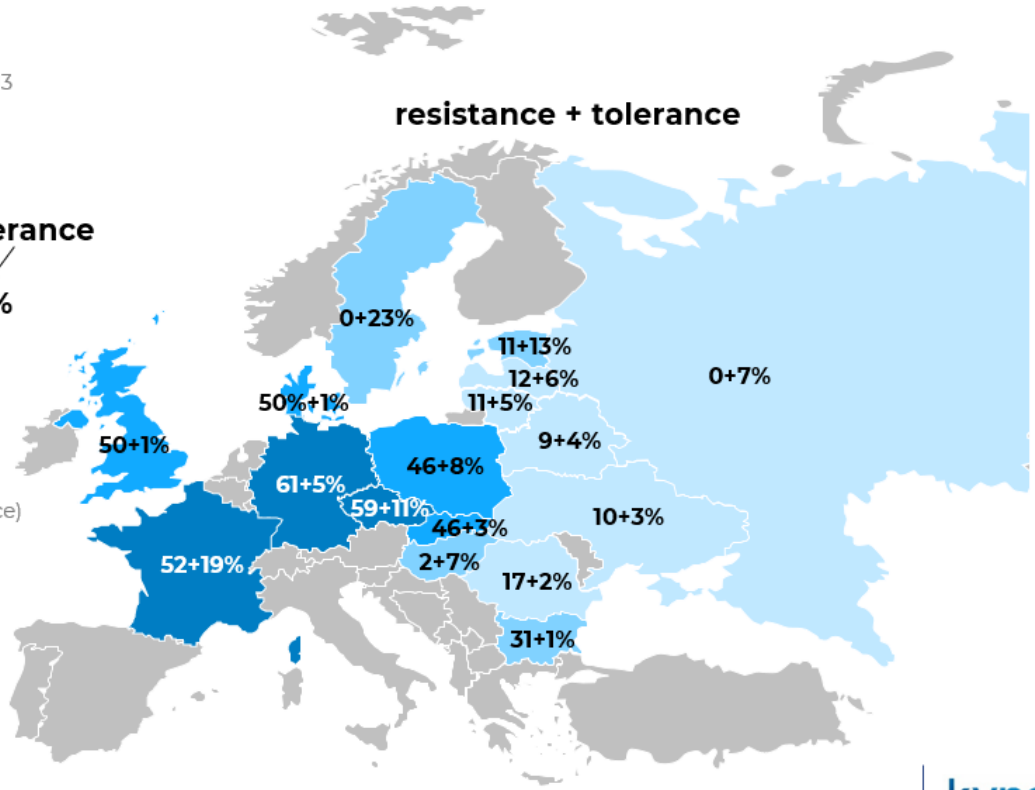


resistance + tolerance

34+7%

Map color
representing % proportion of TuYV (resistance + tolerance)

- >60%
- 40-60%
- 20-40%
- < 20%
- Not resistant
- No data

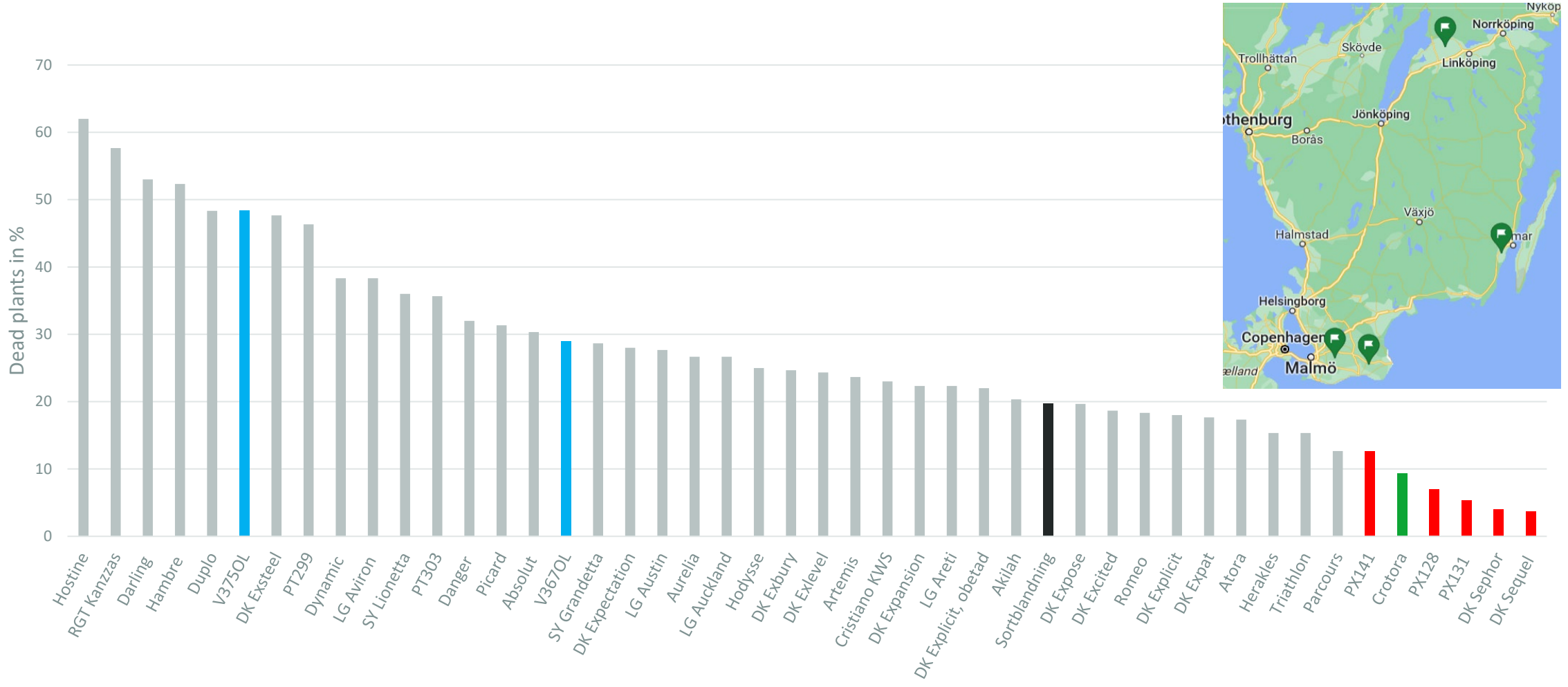


kynetec

66

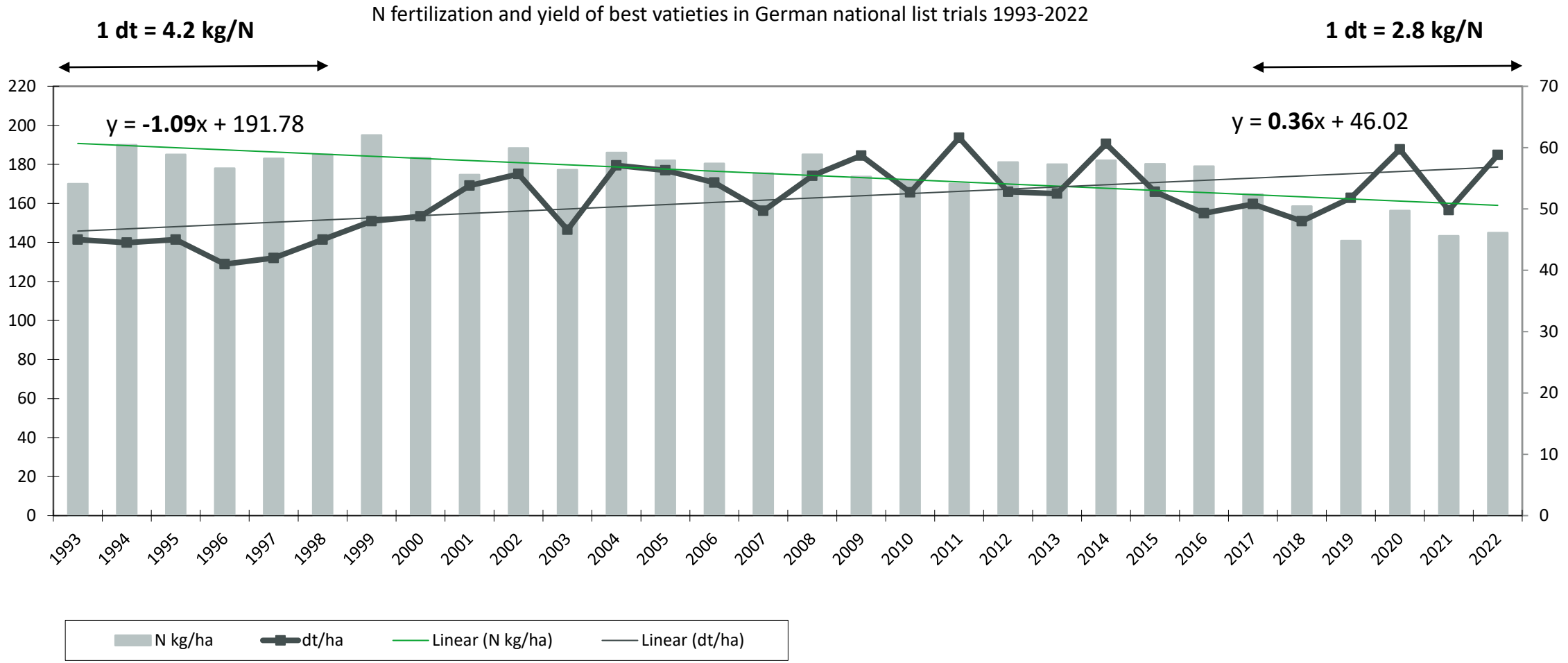
Source: Kynetec

Winter Kill in Swedish WOSR variety trials (2022/23), mean of 4 sites



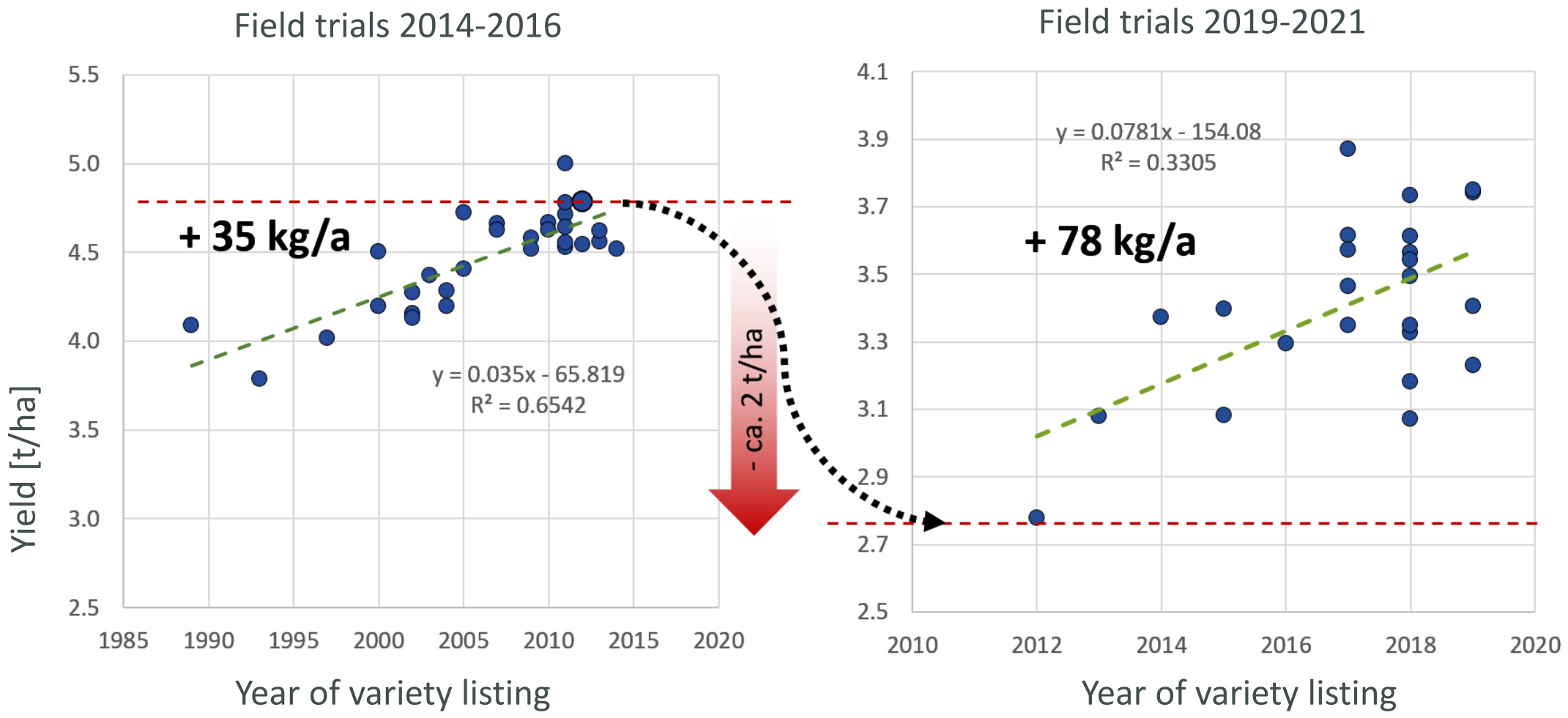
source: https://nfts.dlbr.dk/Forms; sites: VASSMOLÖSA, FORNÅSA, TOMELILLA, GENARP

Genetic Gain in Nitrogen Use Effiency (NUE)



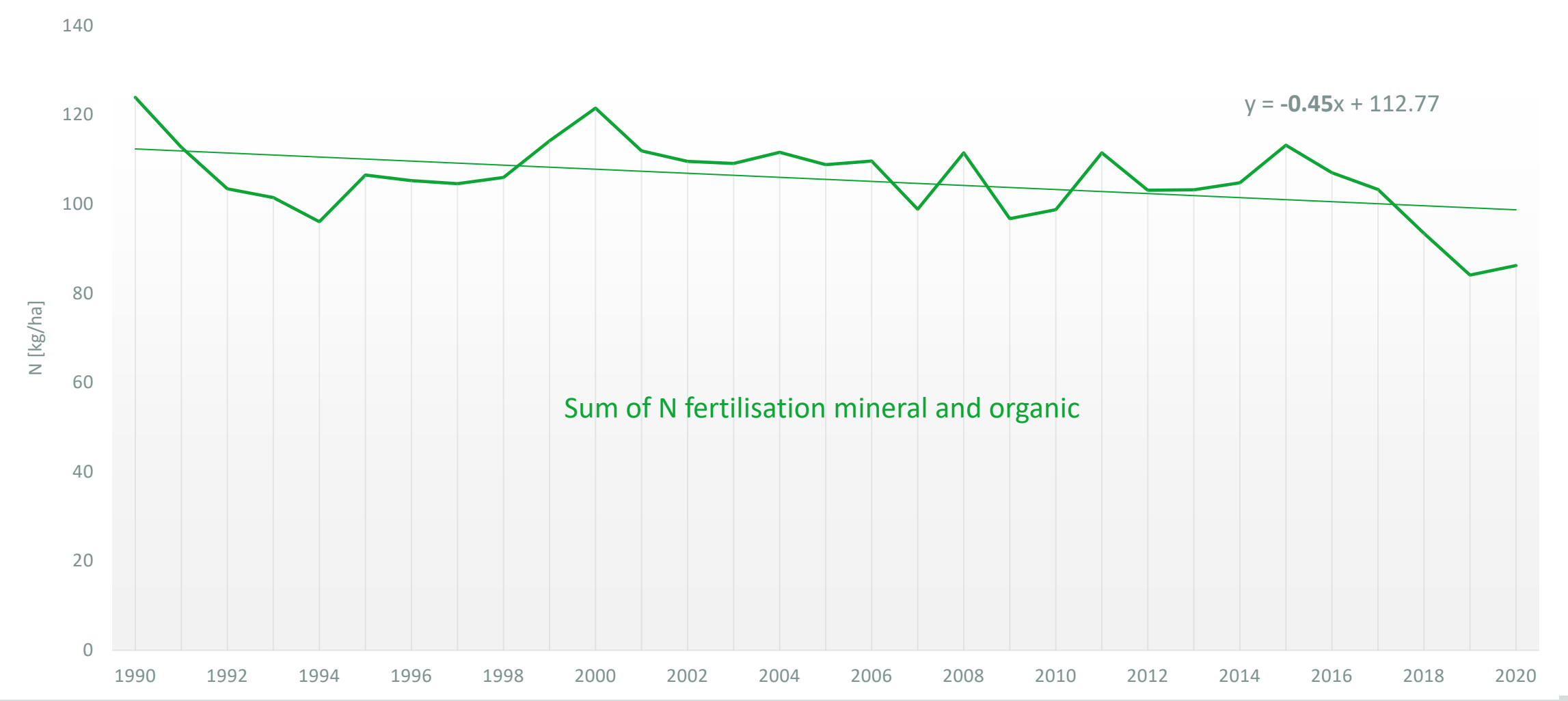
Source: S. Hoette; Bundessortenamt, national list trials Germany

Yield of New Varieties listed since 1989 until 2019 under low N fertilization (120 resp. 125 kg N/ha)



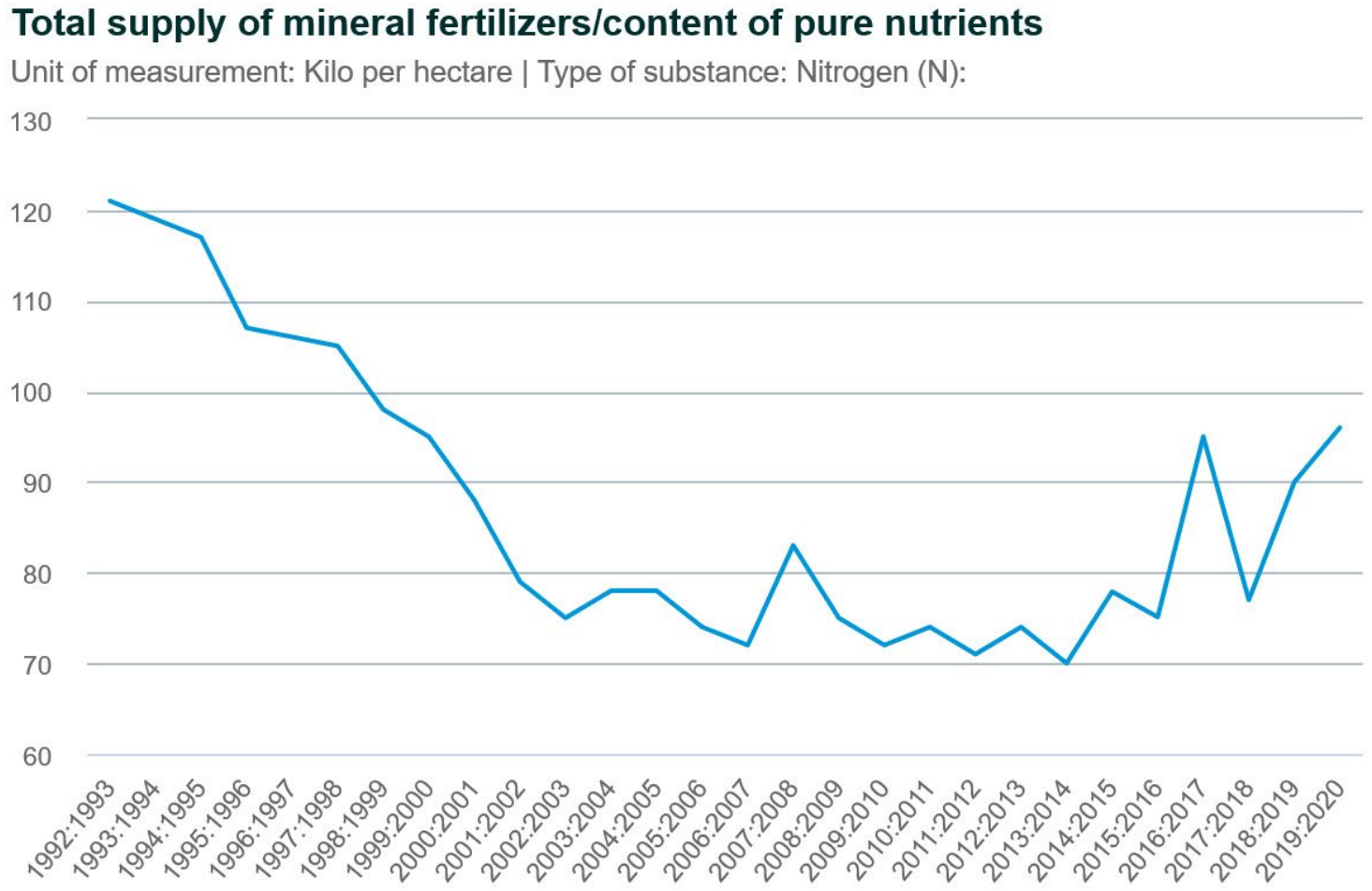
Source: L. Förter, S. Weber, A. Eckert, R. Snowdon (JLU Gießen) and A. Stahl (JKI, Quedlinburg)

Germany: Nitrogen Use all Crops (1990-2020)



Source: Institut für Pflanzenbau und Bodenkunde, Julius Kühn Institut (JKI) und Institut für Landschaftsökologie und Ressourcenmanagement (ILR), Universität Gießen

Denmark: Nitrogen Use all crops (1993-2020)

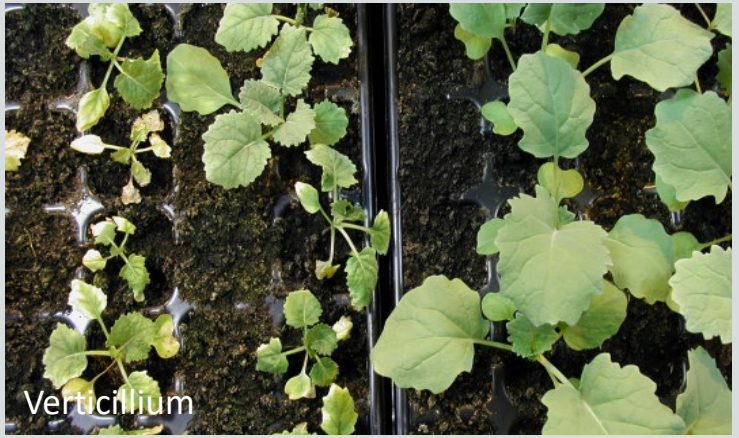


Source:: www.statbank.dk/KVAEL2

Final conclusion

- significant Yield Improvement since 30 Years
- but since about 12 years it is difficult to Harvest higher Yields on Farm Level
- further positive Yield Trends until today in Environments like Poland, Denmark
- there are a lot Improvements in Oil Content, Resistances, NUE
- Genetic Gain is gone into Low Input and Buffering negative Climate Change Effects

WOSR Breeders still have a lot to do



Thank you for your attention!