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SCIENCE AND EDUCATION FOR SUSTAINABLE LIFE

CENTRUM FÖR KEMISKA
BEKÄMPNINGSMEDEL
I MILJÖN

Swedish monitoring results

Gustaf Boström, SLU CKB

Workshop on leakage of pesticides from greenhouses
2020-12-11

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Performed monitoring

- 2008 – SLU study
- 2010 – County Administrative Board of Skåne study
- 2010 & 2016 – Helsingborg municipality studies
- **2017-2018 – SLU study**
- **2018 – County Administrative Board of Skåne study**
- Ongoing – Helsingborg municipality

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Screening of pesticides in streams draining Swedish greenhouses 2017-2018

Study design

- Sampling during one year – summer 2017 to summer 2018
- Sampling in small streams and rivers – catchment sizes 1 to 212 km^2
  - 1-5 greenhouse companies per catchment but also field agriculture
- Samples collected every two weeks
  - Grab sampling (11 sites) – 278 samples
  - Time integrated (TIMFIE) sampling (4 sites) – 81 samples
- Sampling upstream and downstream at 3 sites
- Greenhouse production: vegetables and ornamental plants
  - Interviews with growers
- Samples analyzed for up to 148 different substances (LOD 1-10 ng/l)

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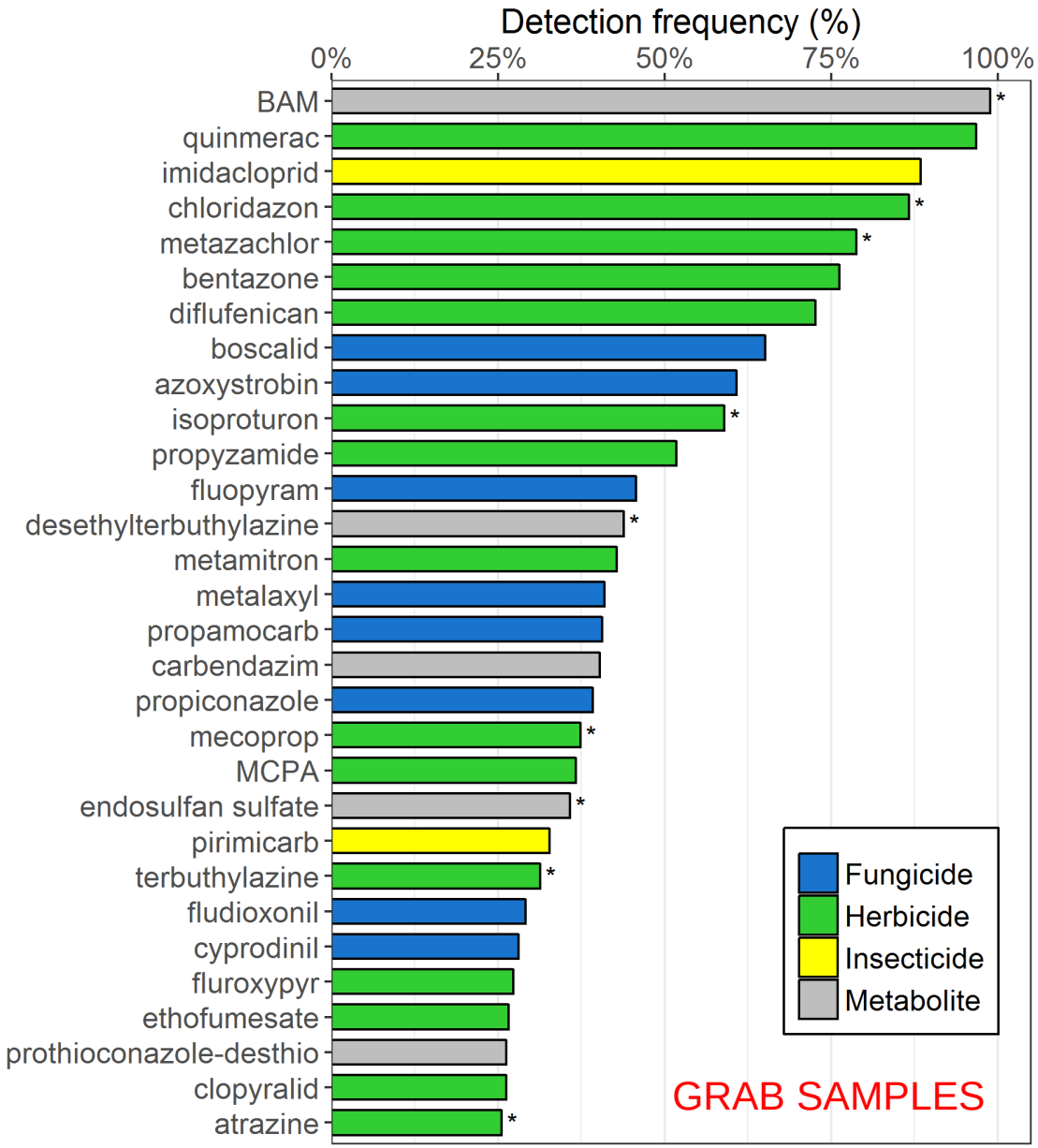
Found substances

- 105 different substances were found in at least one sample
- 34-64 different substances per sampling point
- 30 different substances were found in ≥ 25 % of grab samples



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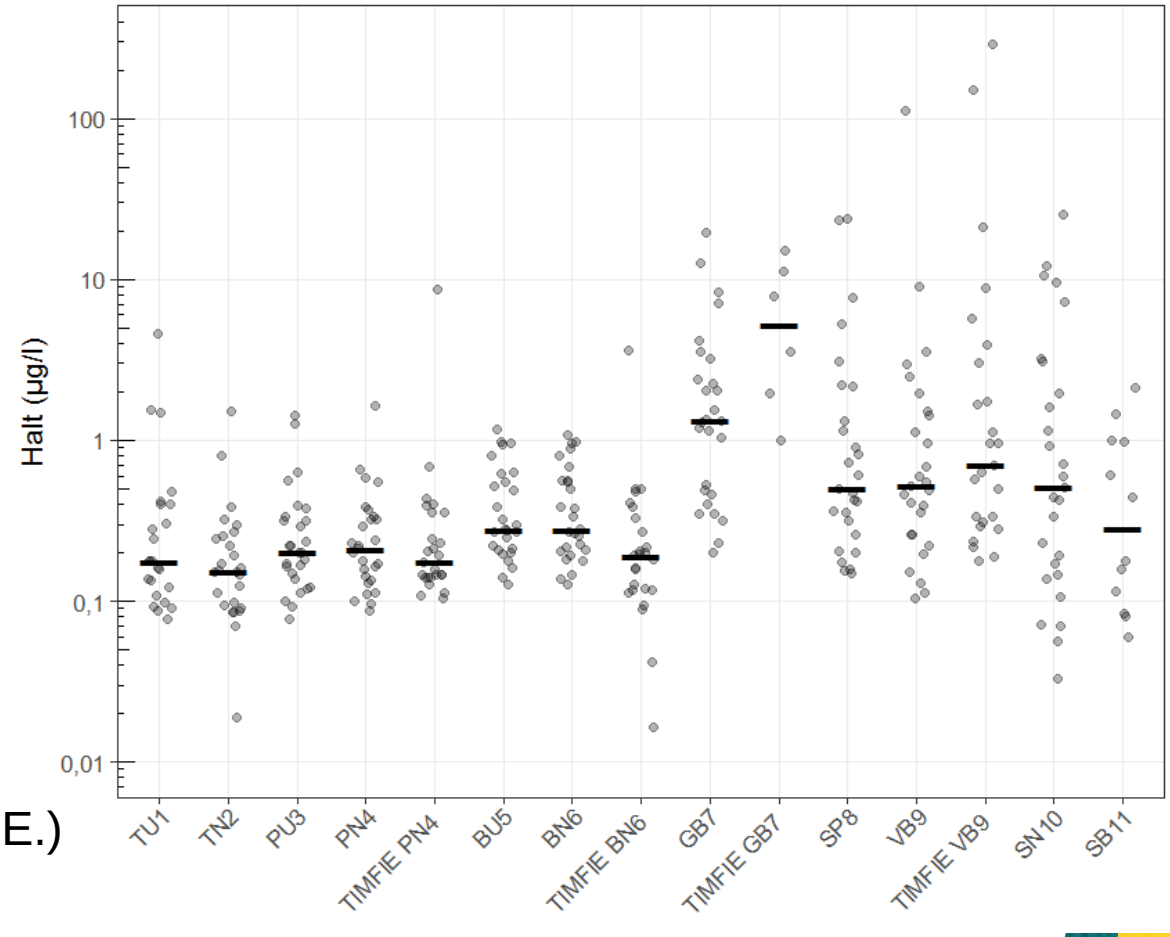
Measured concentrations

- Sum concentrations varied between areas
- Sometimes little difference between upstream and downstream sampling
- At other sites elevated concentrations



The three highest concentrations

298 ug/L propamocarb	(Proplant, Previcur E.)
149 ug/L pymetrozin	(Plenum)
107 ug/L propamocarb	(Proplant, Previcur E.)

All at VB9 – 18 km^2 catchment – 2 companies growing vegetables

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Comparisons to water quality objectives

- Water quality objectives indicate the highest concentration of a substance that is not expected to cause negative effects on aquatic organisms

- The water quality objectives used here are:
  - EU priority substances – EU WFD
  - River Basin Specific Pollutants – Swedish Agency for Marine and Water Management
  - National WQO – Swedish Chemicals Agency
  - Preliminary WQO – SLU

- Varies greatly between substances
  0.00008 µg/L to 400 µg/L

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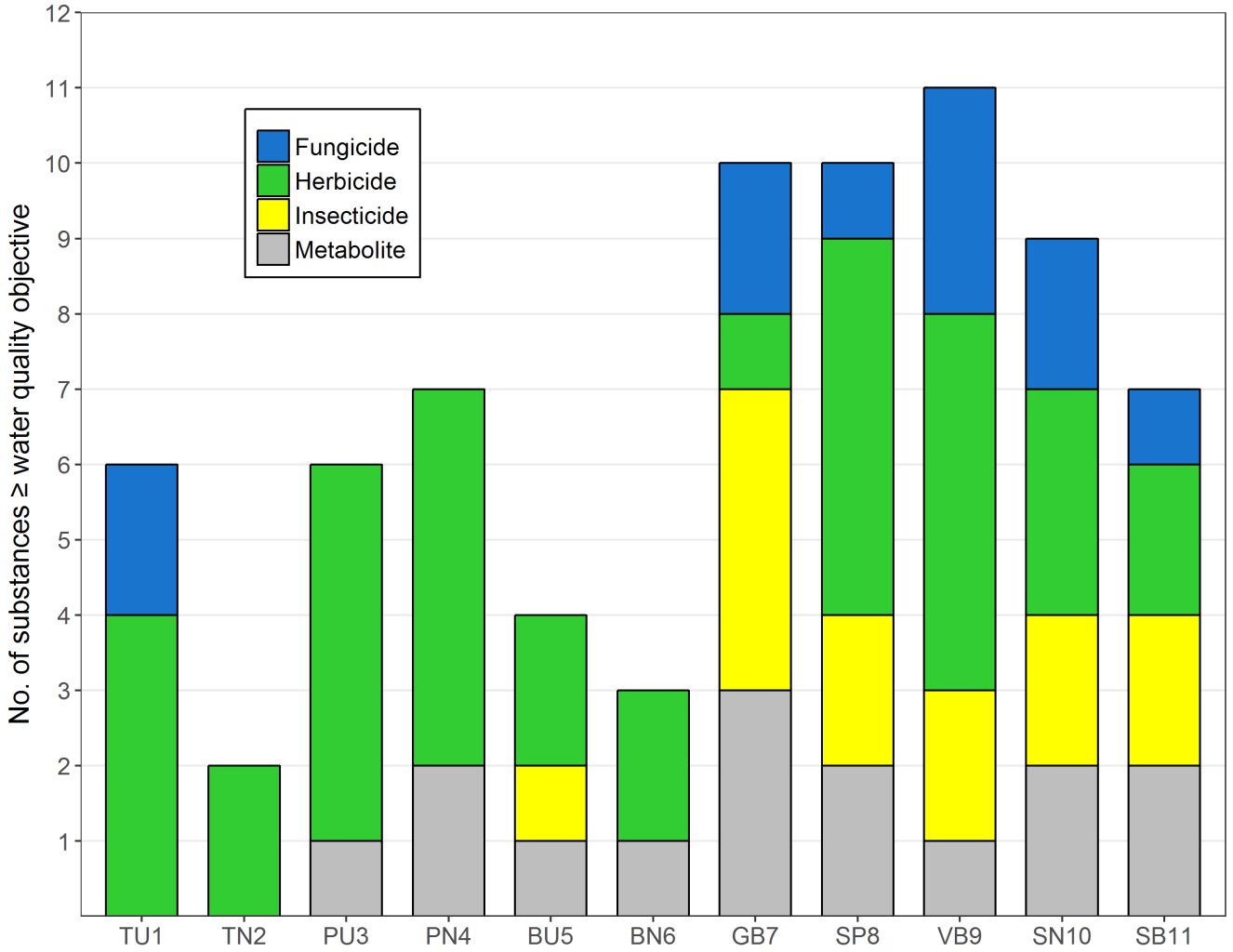
Comparisons to water quality objectives

- 25 different substances were found ≥ water quality objective in at least one grab sample
- 17 different substances in TIMFIE samples
- Many exceedances for herbicides – not used in greenhouses



GRAB SAMPLES

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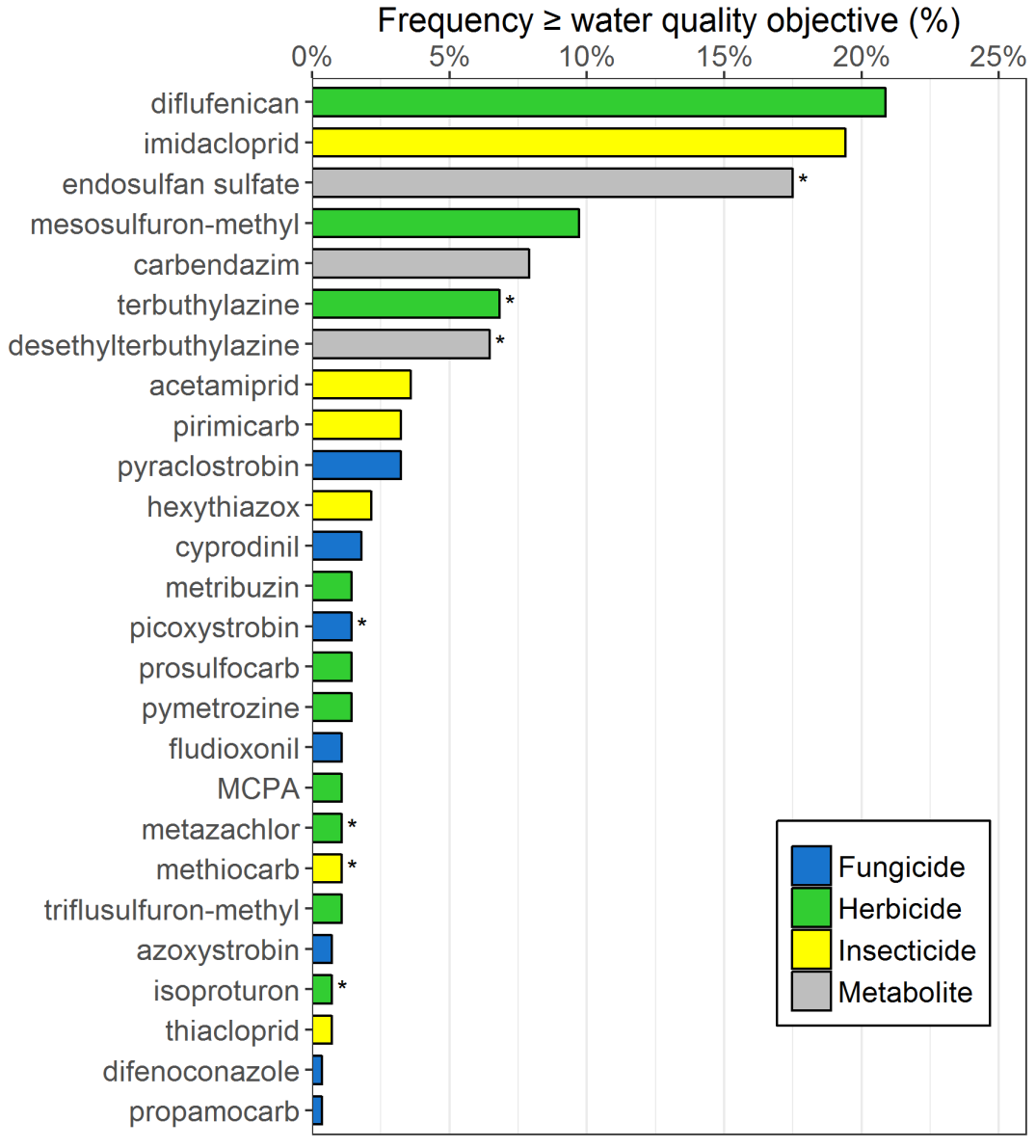
Comparisons to water quality objectives

Highest number of exceedances in grab samples for the herbicide diflufenican (21 %)

…followed by the insecticide imidacloprid (19 %)

…and the transformation product endosulfan sulfate (18 %)

Imidacloprid had the highest exceedance - 217 times higher than the water quality objective



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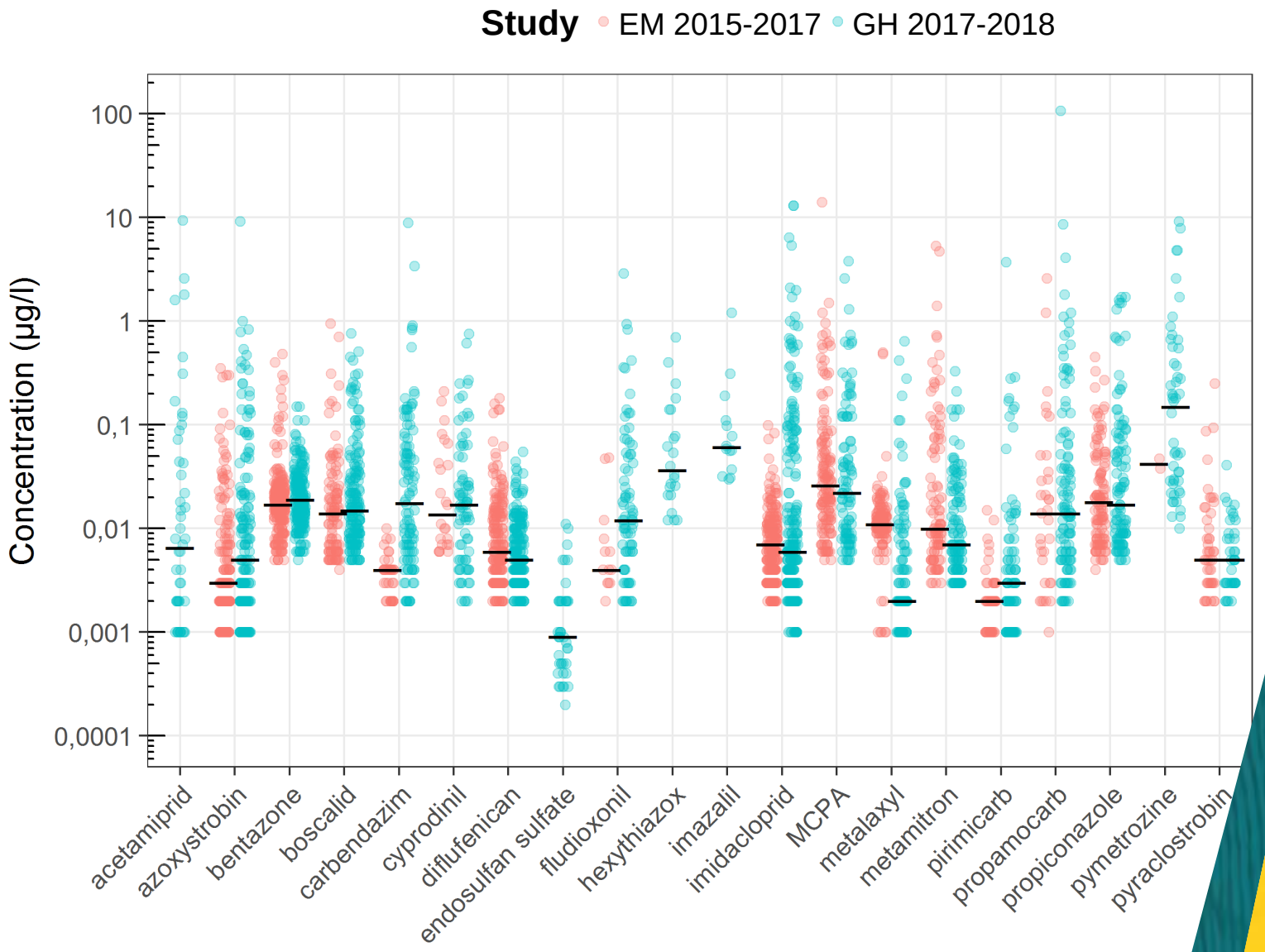
Comparisons to monitoring in agricultural areas

- 20 substances were chosen
  - Both typical greenhouse substances and typical agricultural substances
- Measured concentrations are higher in GH than EM for some substances used in greenhouses
- The opposite for some substances with agricultural use



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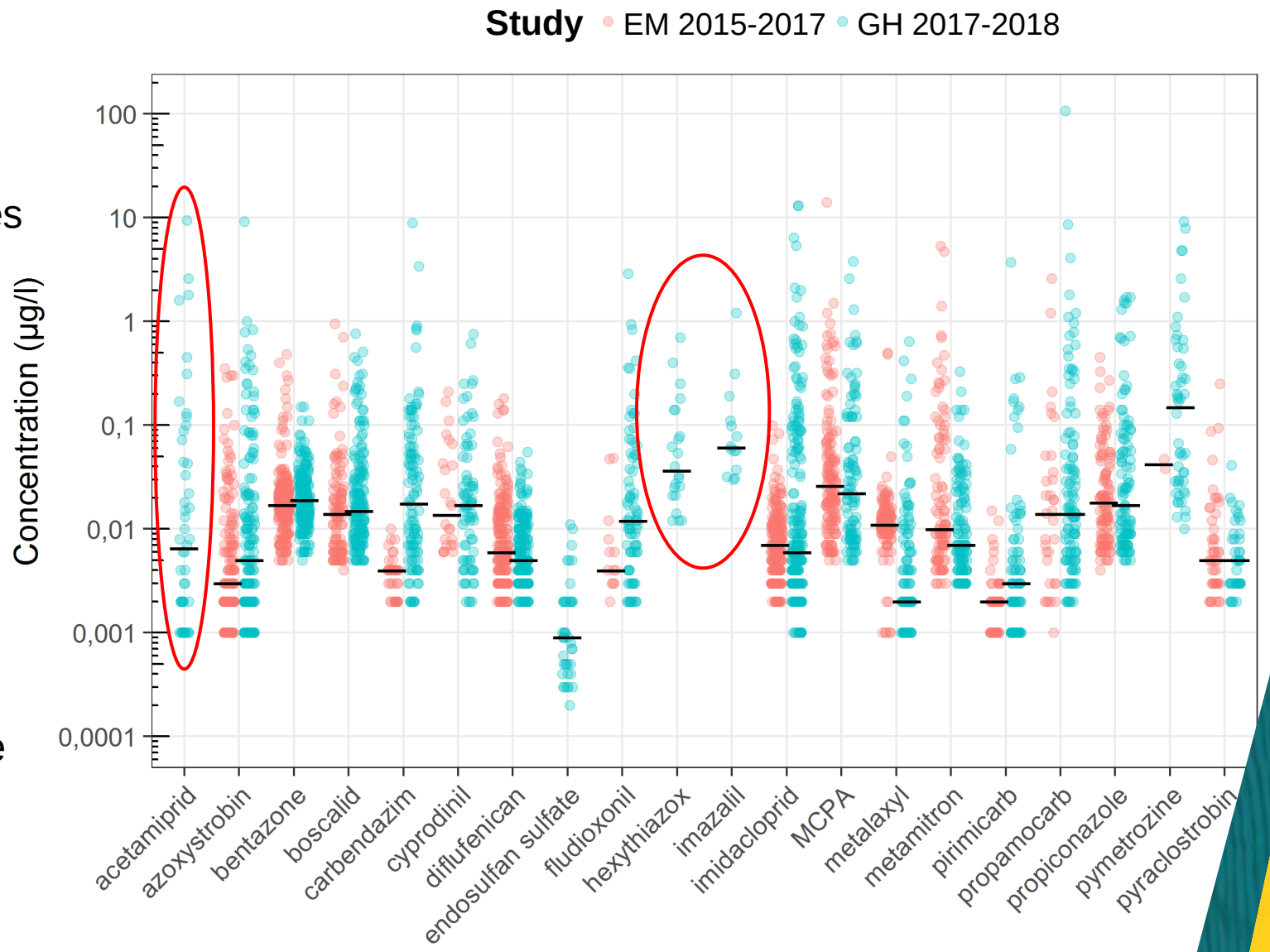
Comparisons to monitoring in agricultural areas

- Measured concentrations are higher in GH than EM for some substances used in greenhouses
  - acetamiprid
  - carbendazim
  - fludioxonil
  - hexythiazox
  - imazalil
  - imidacloprid
  - pirimicarb
  - propamocarb
  - pymetrozine

- The opposite for some substances with agricultural use
  - bentazone
  - diflufenican
  - metamitron



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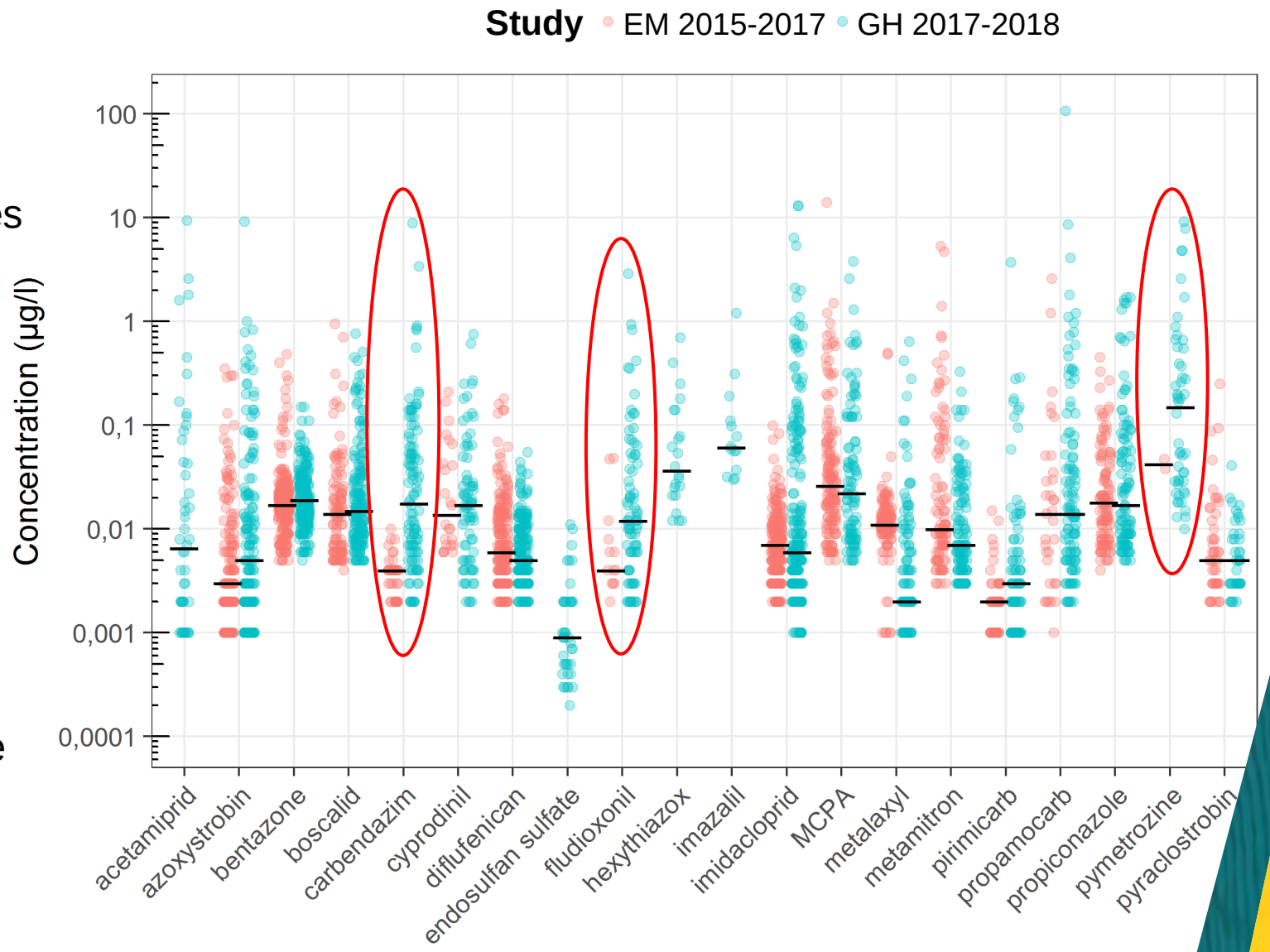

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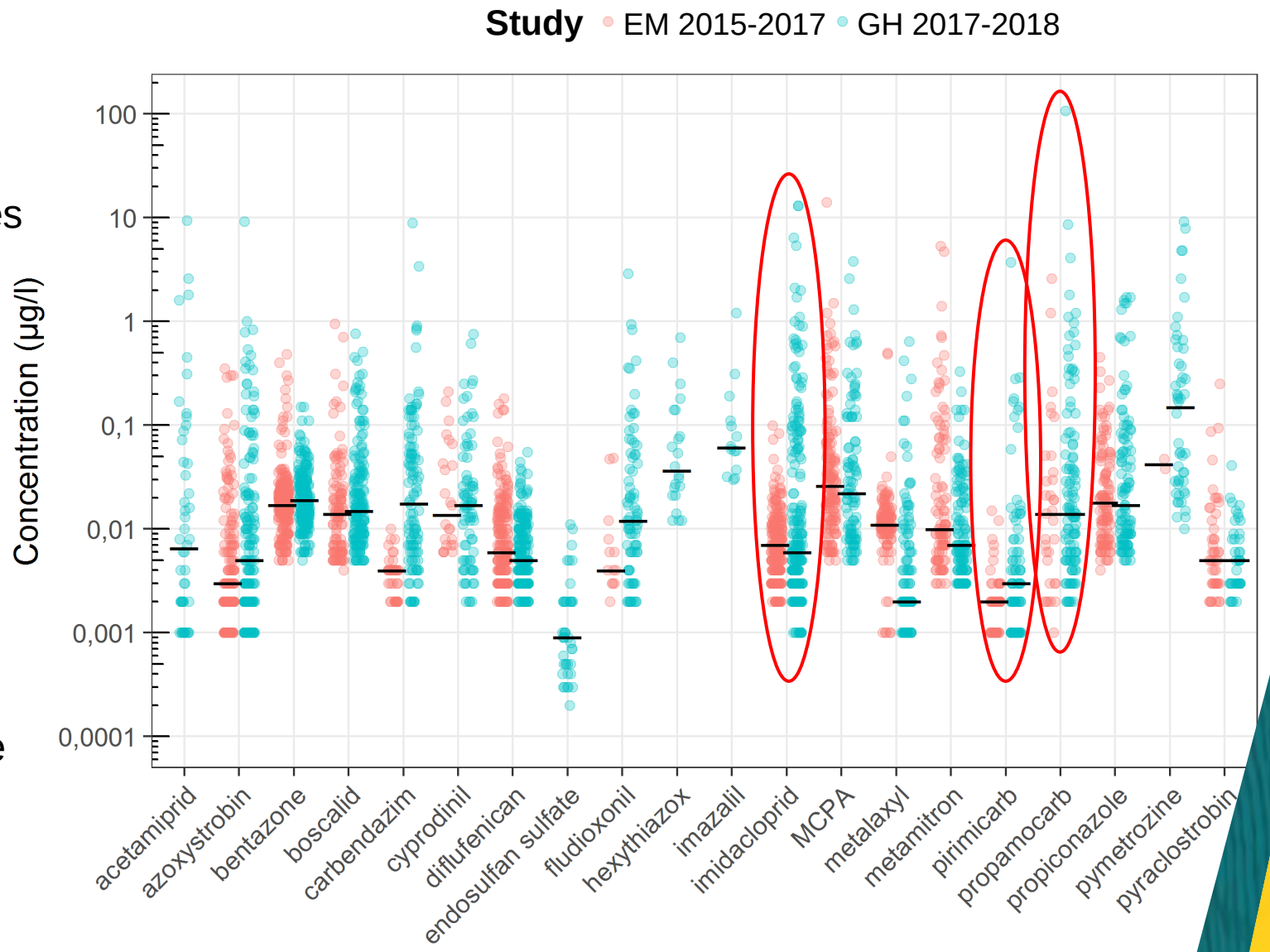

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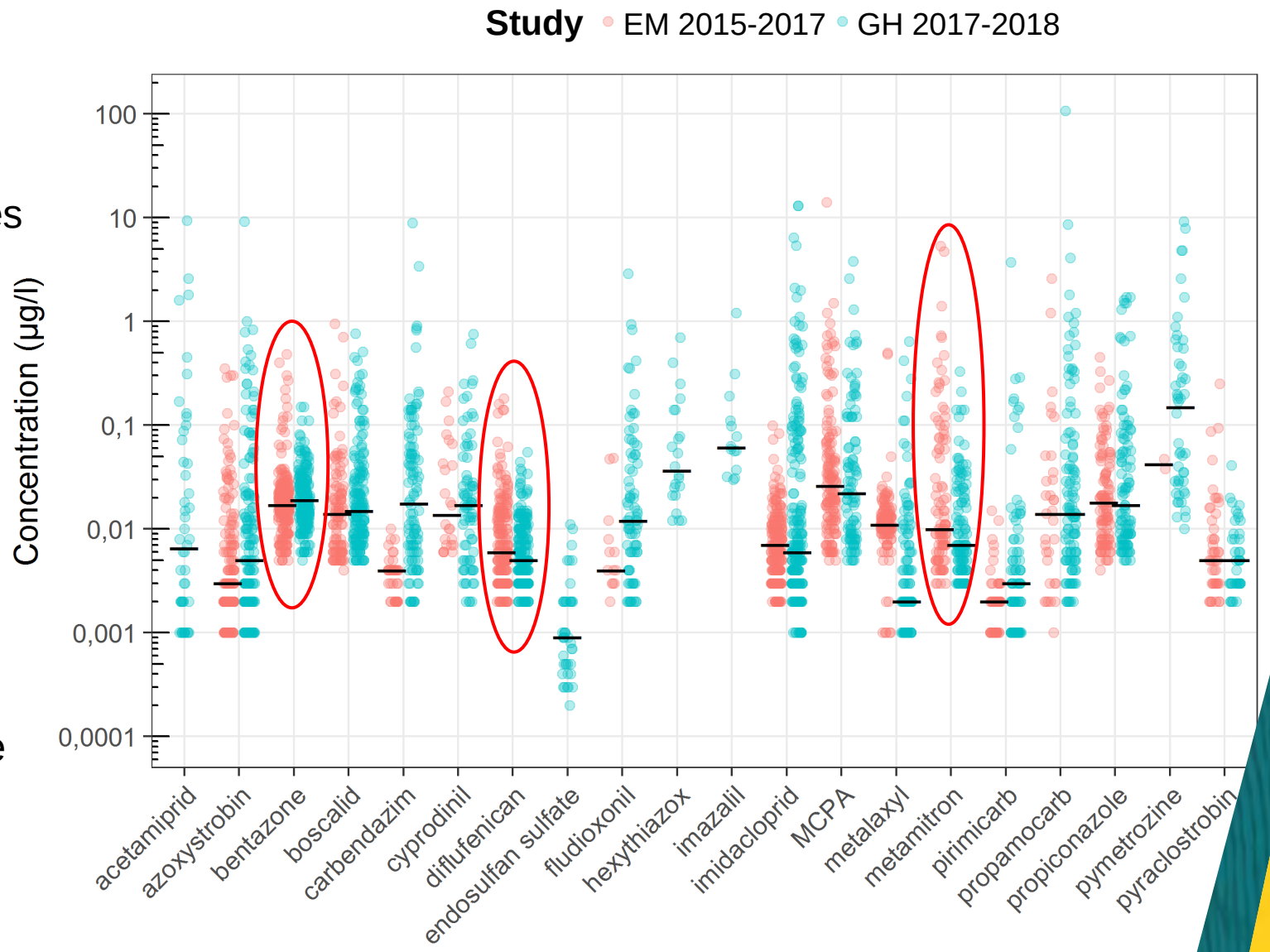

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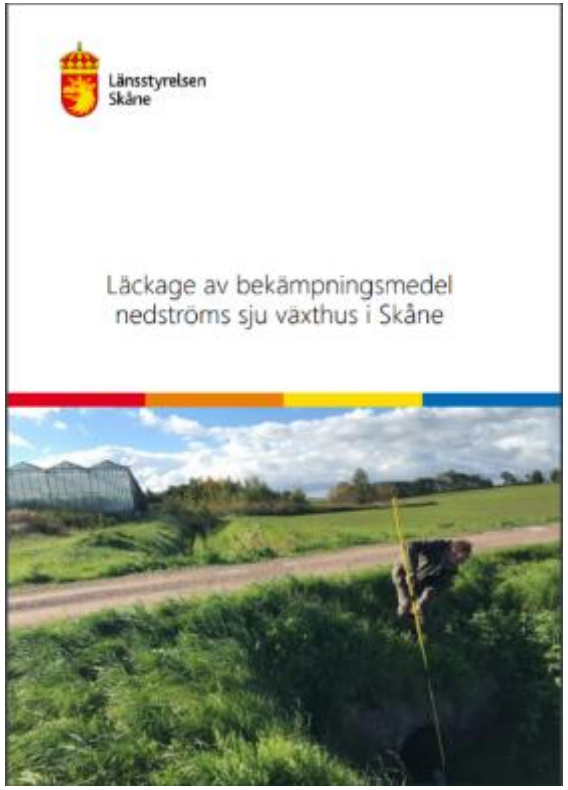
County Administrative Board of Skåne Study 2018

- 7 greenhouses – both vegetables and ornamentals
- Grab sampling in small to medium sized rivers, approx. 10-1100 m from the greenhouse
- 5 sampling dates – sep-dec 2018
- 118 substances – samples analyzed by SLU



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County Administrative Board of Skåne Study 2018

- 68 substances found in at least one sample
  (19 allowed for greenhouse use)

- 11 substances exceeded water quality objectives
  (5 allowed for greenhouse use)

- Highest measured concentrations
  - 8.1 µg/l propamocarb (sample taken in culvert)
  - 4.7 µg/l clethodim
  - 3.3 µg/l prosulfocarb
  - 2.6 µg/l cyprodinil
  - 2.2 µg/l imidacloprid

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County Administrative Board of Skåne Study 2018

Substance	Detection frequency (%)	Water Quality Objective	>WQO (%)	>WQO
imidacloprid	100	0.005	77/40	27/35 or 14/35
diflufenican	69	0.01	17	6/35
cyprodinil	74	0.2	14	5/35
metazachlor	74	0.2	11	4/35
prosulfocarb	94	0.9	3	1/35
fludioxonil	69	0.5	3	1/35
hexythiazox	17	0.1	3	1/35
picoxystrobin	17	0.01	3	1/35
thiacloprid	14	0.03	3	1/35
mesosulfuron-methyl	6	0.006	3	1/35
prochloraz	3	0.06	3	1/35

WQO 0.005 µg/L valid since 2019 or old preliminary value 0.06 µg/L

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Imidacloprid – e.g. Confidor WG 70

- In Sweden Confidor WG 70 was the last registered plant protection product containing imidacloprid

- After the study 2017-2018 the Swedish Chemicals Agency changed the conditions for using Confidor WG 70 to only be allowed in closed greenhouses which meet the definition in Reg. (EC) No 1107/2009 *”[…] and prevents release of plant protection products into the environment.”*

- EU application for prolonged registration of imidacloprid as plant protection product was revoked by the applicant, Bayer. Not approved since 1 Dec 2020.

- In Sweden cancellation of approval for Confidor WG 70 from 2 Dec 2020

  It can be sold until 2021-06-02 and used until 2022-06-01 (in closed greenhouses)

- Imidacloprid still allowed in some biocide products, e.g. against ants

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Conclusions from Swedish monitoring

- From several greenhouses there is an ongoing transport of pesticides to nearby surface waters
- From some greenhouses there is negligible leaching
- Difficult to completely rule out other sources – But, several detected substances are clearly linked to use in greenhouses
- Further work with risk mitigation is needed within the greenhouse industry

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Thanks for your attention!

Questions?

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Länsstyrelsen Skåne

NATURVÅRDSVERKET
SWEDISH ENVIRONMENTAL PROTECTION AGENCY

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