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Bream spray drift model – example results & conclusions

Comparison of BREAM model with experimental data

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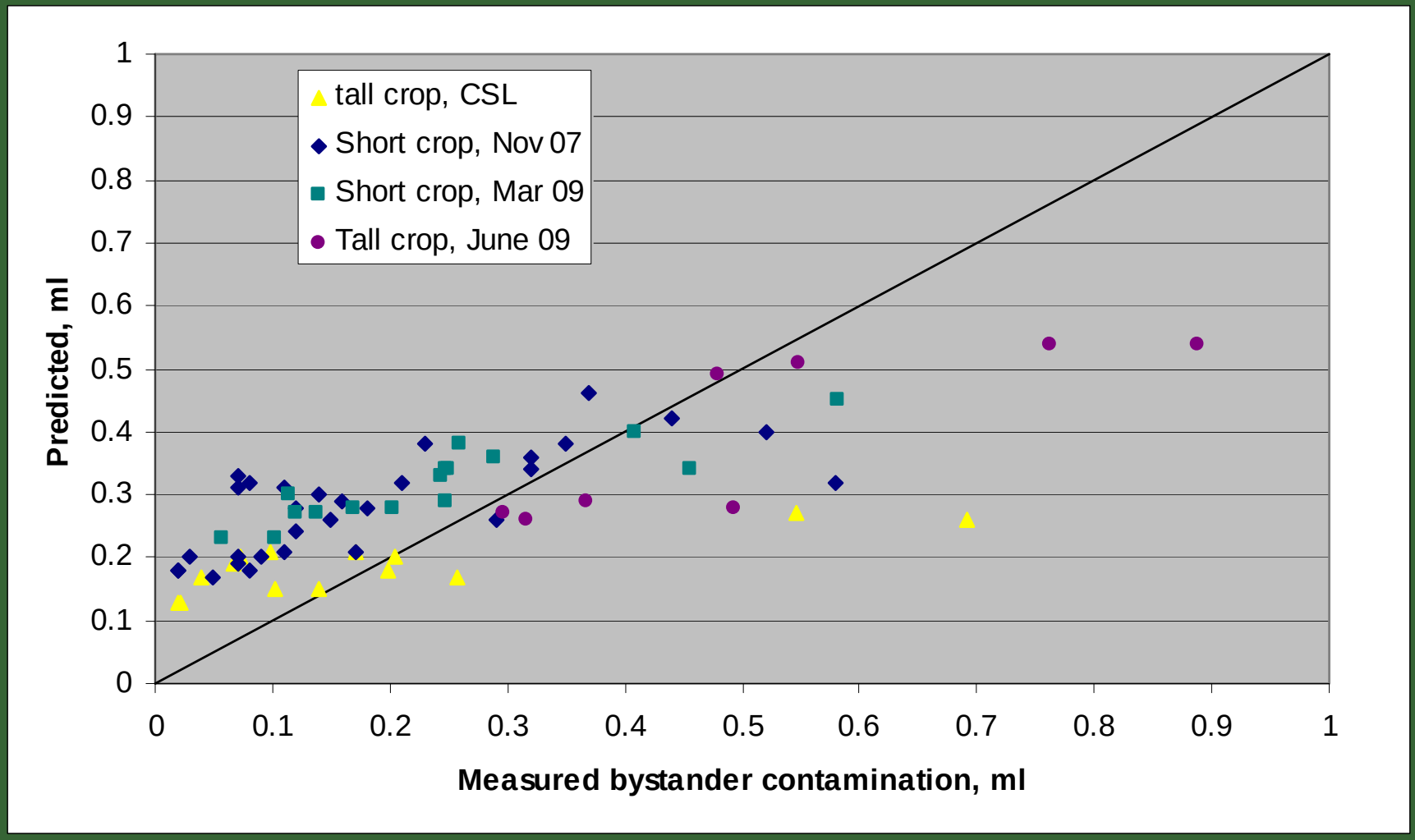

Comparison of BREAM model with experimental data – 25th and 75th percentiles

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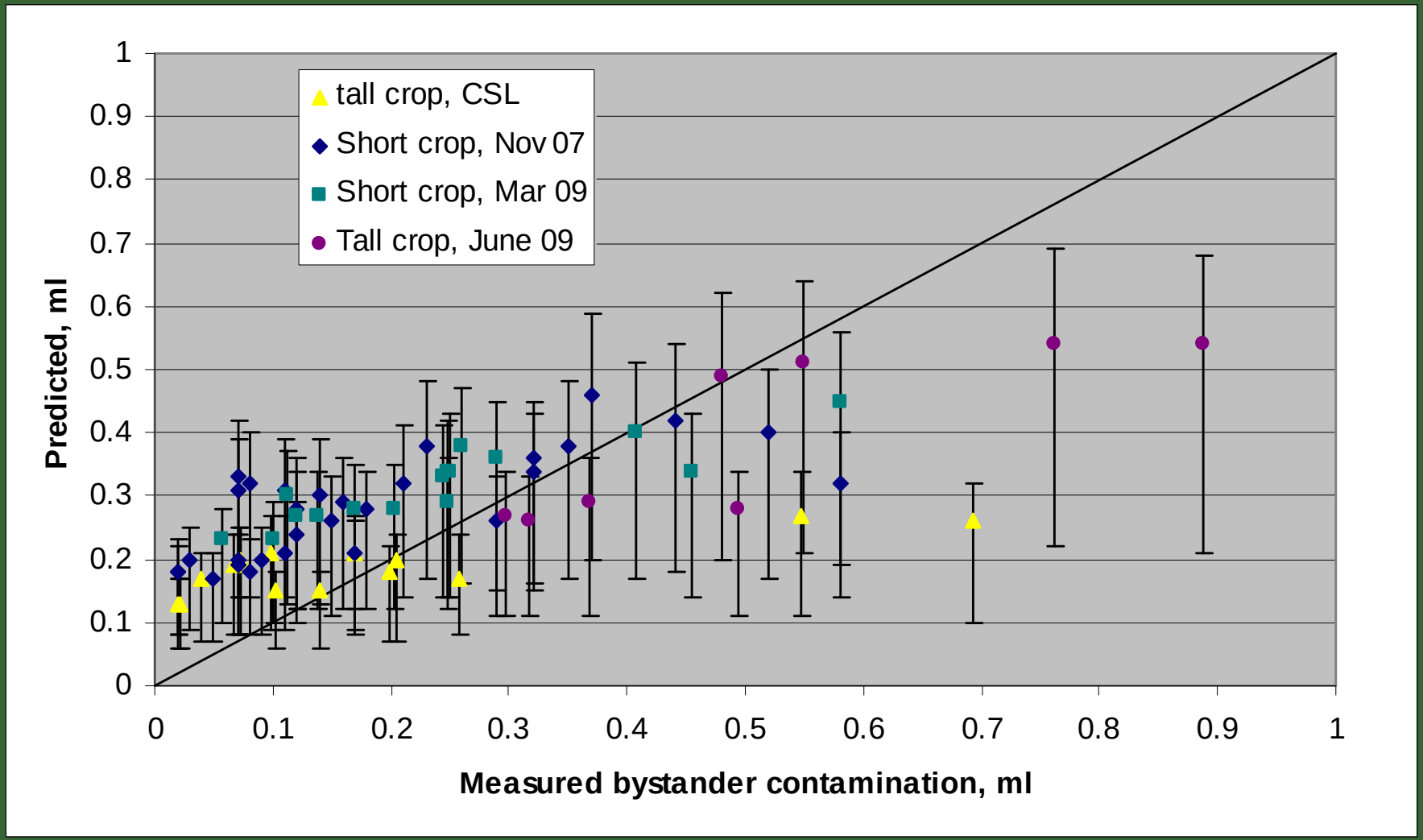

Example results
120g/ha applied dose:

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Flat fan '03' nozzle at 3.0 bar, short crop, 24 m boom, two passes		Adult dermal exposure, mg	Child dermal exposure, mg
Standard scenario 12 km/h, 0.7 m, 2.5 m/s	Mean	0.32	0.27
	95th percentile	0.86	0.73
Example high drift scenario 16 km/h, 1.0 m, 3.5 m/s	Mean	0.58	0.47
	95th percentile	1.57	1.23

cf current approach: 0.1 mg standard, 0.133 mg high drift

Example results

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	Adult inhalation exposure, mg	Child inhalation exposure, mg
Standard scenario		
Mean	$8.0e^{-4}$	$1.2e^{-3}$
95th percentile	$1.6e^{-3}$	$1.9e^{-3}$
Example high drift scenario		
Mean	$1.4e^{-3}$	$2.1e^{-3}$
95th percentile	$3.7e^{-3}$	$4.5e^{-3}$

cf current approach: 6.0e-3 mg standard; 8.0e-3 mg high drift

Example results – assuming 10% dermal absorption

	Total adult exposure, mg	Total Child exposure, mg
Standard scenario		
Mean	$3.82e^{-2}$	$2.82e^{-2}$
95th percentile	$8.76e^{-2}$	$7.49e^{-2}$
Example high drift scenario		
Mean	$5.94e^{-2}$	$4.91e^{-2}$
95th percentile	$1.61e^{-1}$	$1.27e^{-1}$

cf current approach: 1.6e-2 mg standard; 2.13e-2 mg high drift

Example results – predicted exposure relative to current risk assessment

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	Total adult exposure, mg	Total Child exposure, mg
Standard scenario		
Mean	2.05	1.76
95th percentile	5.48	4.68
Example high drift scenario		
Mean	2.79	2.31
95th percentile	7.54	5.96

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Factors which could increase exposure further

- More downwind passes
- Finer droplet size
  - Different nozzle design (espec. extended range, smaller nozzle size)
  - Spray liquid properties
  - Higher pressure/faster forward speed
- Downwind structures – gap in a solid obstruction
- Movement of the bystander
  - Spend longer in the spray plume
  - Increase ‘collection efficiency’

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Spray drift mitigation

- The model can show how to reduce spray drift
  - Low boom with good control
  - Nozzle design
  - Buffer zone

- Other factors relevant to product could help reduce exposure
  - Formulation properties
  - Crop canopy

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Summary of model of exposure to spray drift

- Spray drift model robust and well validated for conditions close to standard scenario
  - Flat fan ‘reference’ nozzle
  - Short crop and downwind vegetation
- More work needed
  - Improving emulation and/or mapping to bystander exposure
  - Adding more nozzles to the database
  - Effects of formulation could be considered
  - Effect of buffer zones needs to be refined

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Summary of exposures to spray drift

- Direct dermal exposure likely to be the greatest
  - Inhalation low by comparison
  - Ground deposits lower than airborne spray
  - Transfer coefficients likely to be small for ground – dermal

- The scenario for the exposure assessment is crucial:
- Closer to the sprayer and higher booms will give
  - Mean (or 75th percentiles) for standard scenarios significantly greater than current approach
  - 95th percentile for higher drift scenario could be more than an order of magnitude higher


Thank you for your attention