Empirical Data Used for Label Statements - Calculating spray drift buffers using FIFRA methodology

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Presentation Outline

- Requirements for protecting sensitive areas
- Using models to achieve requirements for labeling
- Compare Modeling to (a small sub-set) field data
- Summary Remarks

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Off- Target Spray Drift

- Typically our industry has focused on drift from the perspective of protecting endangered species habitat. There have been a number of lawsuits that have suggested that measures are not protective enough (but always without data).
- More recently, EPA has issued a draft revision for regulating spray drift.
- Therefore industry has been further evaluating the tools we use and get regulated with in an effort to explore spray drift concerns.

A1

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Draft PR Notice

EPA issued Draft Guidance on Pesticide Drift Labeling

57166 Federal Register / Vol. 74, No. 212 / Wednesday, November 4, 2009 / Notices Conservation Policy

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ENVIRONMENTAL PROTECTION AGENCY

[EPA–HQ–OPP–2009–0628; FRL–8794–9]

Pesticides; Draft Guidance for Pesticide Registrants on Pesticide Drift Labeling

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of availability.

Despite PR Notice requirements, we still have to provide the information in this discussion (and have had too for ES purposes)

Slide 4

A1 Previously, spray drift information (restrictions) were scattered around in various areas of the label - Perhaps in the ES section or in restrictions.

Administrator, 2/5/2010

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How Do We Derive Information Required for Buffers?

- Do we have a reliable, reproducible method for calculating buffer distances? (yes and no).

- Do we have established methods for determining effects endpoints? (yes, but are they appropriate?).

- For the purposes of this presentation, we will focus on **ground** applications for protection of **terrestrial** species (e.g. plants).

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What is the Basis for Defining a Buffer Distance?

A crop protection label has (or will have) the following Table

Ground Boom Sprayer Drift Requirements:

Nozzle height, droplet size, wind speed, and buffer zones between application sites and specified sensitive areas must be consistent with the following table:

Wind Speed	Nozzle Height	Droplet Size (ASAE Standard 572)	Buffer Zone
Less than ***X*** mph	Up to ***A*** feet	Medium or coarser	***D*** feet
	A to ***B*** feet	Coarse or coarser	***E*** feet
	B to ***C*** feet	Very Coarse or coarser	***F*** feet
X to ***Y*** mph	Up to ***A*** feet	Coarse or coarser	***G*** feet
	A to ***B*** feet	Very Coarse or coarser	***H*** feet
	B to ***C*** feet	Extremely Coarse or coarser	***I*** feet
DRT *			***J*** feet
DRT **			***K*** feet
DRT *** or higher			***L*** feet

The applicator must consider equipment speed, nozzle angle, and pressure in determining droplet size.
Do not apply when the wind speed exceeds ***Y*** miles per hour.
Do not apply with a nozzle height of greater than ***C*** feet above the ground or crop canopy.
Do not apply within the buffer zone distance of the following sites: **[specify sensitive site(s) of concern specific to product]**.

Today's example is focused on ground applications

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Non-Target Studies

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Terrestrial Protection Example

- We typically use one of two guideline studies
- Series 850 - Ecological Effects Test Guidelines
- Seedling emergence or vegetative vigor
- Decision of study selection is driven by the lowest endpoint
- Study has 10 species that are used as sentinels' for other species (typically endangered)
- Corn, ryegrass, onion, wheat, lettuce, soybean, tomato, cabbage, carrot, canola

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Plants about the time of Treatment

10 cm tall pots

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Evaluations

- Spray at 3-4 true leaves, ~ 10 cm height
- Evaluate on Days 7, 14, and 21
- Determine NOER (no-observed-effect rate), lowest-observable-effect-rate (LOER), ER_{25}, and ER_{50}
- Height, Dry Weight, Survival

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Selection of the Endpoint for Comparison

Species Common name (Latin name)	Family	ER_{25} (lb a.e./Ac)	Most Sensitive Endpoint	NOER (lb a.e./Ac)	NOER Most Sensitive Endpoint
Corn (*Zea mays*)	Poaceae	> 2.0	-[1]	2.0	-[2]
Ryegrass (*Lolium perenne*)	Poaceae	> 2.0	-[1]	2.0	-[2]
Cabbage (*Brassica oleracea*)	Brassicaceae	0.72	Dry	0.025	Dry Weight
Wheat (*Triticum aestivum*)	Poaceae	0.52	Dry	0.26	Height, Dry Weight
Oilseed Rape (*Brassica rapa*)	Brassicaceae	0.49	Dry	0.077	Dry Weight
Onion (*Allium cepa*)	Liliaceae	0.41	Dry	0.26	Dry Weight
Carrot (*Daucus carota*)	Apiaceae	0.083	Dry	0.025	Dry Weight
Lettuce (*Lactuca sativa*)	Asteraceae	0.020	Dry	0.0024	Dry Weight
Tomato (*Lycopersicon esculentum*)	Solanaceae	0.00091	Dry	0.00026	Dry Weight
Soybean (*Glycine max*)	Fabaceae	0.00062	Height	0.00026	Height

Plant are sprayed in a spray chamber – remember this is our "model system" for drift

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What Areas are Protected?

- Or, once I have the NTP endpoint, what are we protecting?
- Formerly, EPA chose distances to endangered species habitat areas.
- However, now there is no longer differentiation between endangered species habitat and other areas.
- Now the protected area is designated as **“non-target”** (See Capreno or Integrity labels).

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Spray Modeling – What are the Variables

- Droplet Spectra (VMD_{50}) (not nozzle type e.g. 8004)
- Maximum Release Height
- Maximum Wind Speed toward target area
- Shut boom(s) off near sensitive areas, and or spray offset

- Keep changing parameters until we get the emission below the designated effect concentration.

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Buffer Determination - Iterative Process

Release height, VMD, Wind, etc.

Exposure?

Below Effect?

Fail? Re-adjust

Do until you get a buffer and a set of restrictions you can live with.

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Final Product – Completed Table for Label

Rate (lb/ac)	MOA	pct	Boom Height	Droplet VMD_{50}	Model	Buffer (ft)
0.25	ground	90	50”	341	AgDRIFT	775
0.50	ground	90	50”	341	AgDRIFT	> 900
1.00	ground	90	50”	341	AgDRIFT	> 900

Max Wind is missing because – not in AgDRIFT ground

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Using our Models

- For EPA, we currently have two (accepted) models to predict exposure AGDISP, and AgDRIFT) aerial and ground)

- Industry believes that our current aerial models are okay, but that the ground models (AGDISP, and AgDRIFT) do not work satisfactorily.

- In Canada, we have the additional PMRA-EAD Drift tool to use (for ground), but there has been no harmonization in this area yet.

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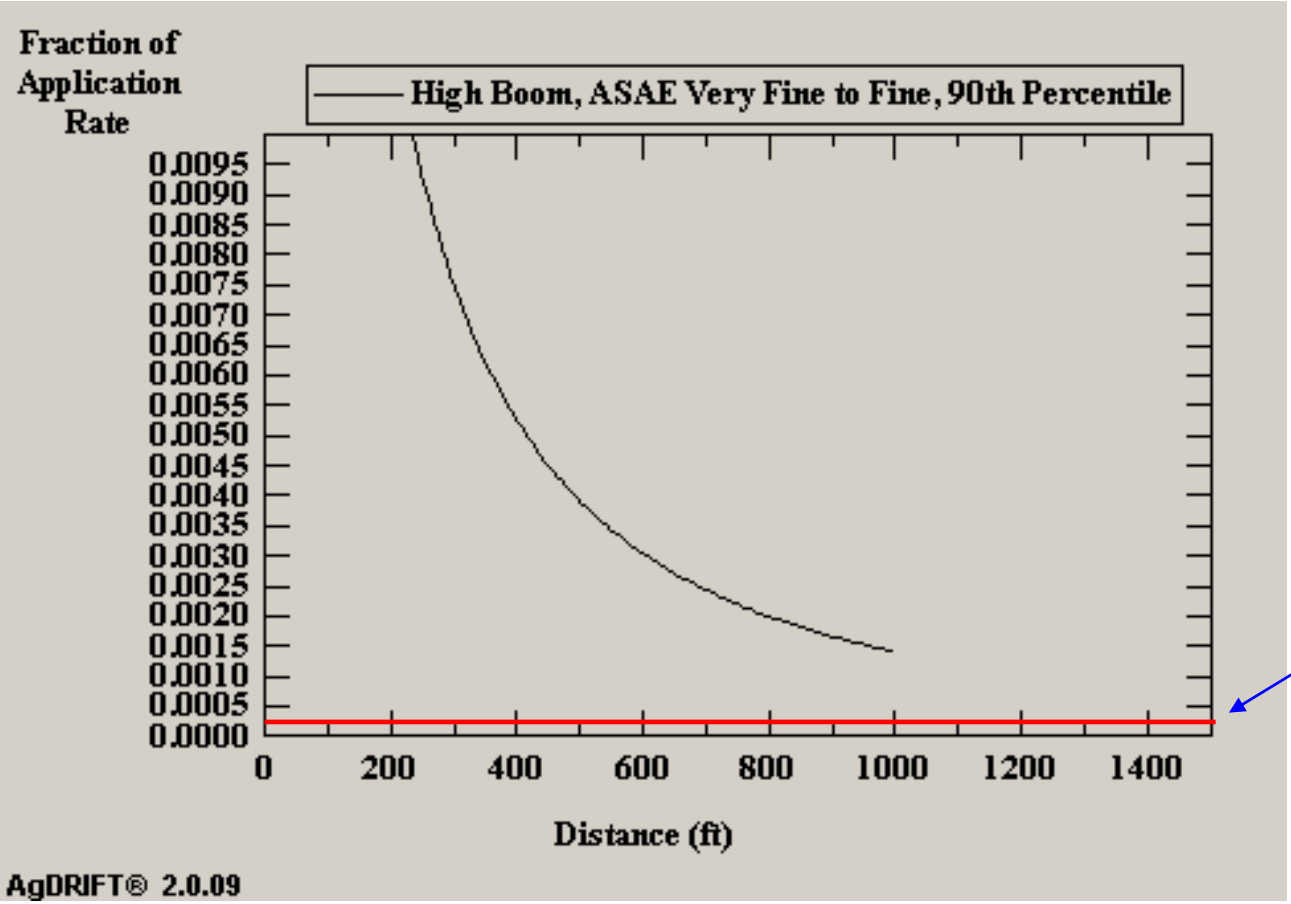
Example – AgDRIFT ASAE VFine to Fine

Effect Concentration of 0.00026 lbs/ac



NOER from non-target plant study

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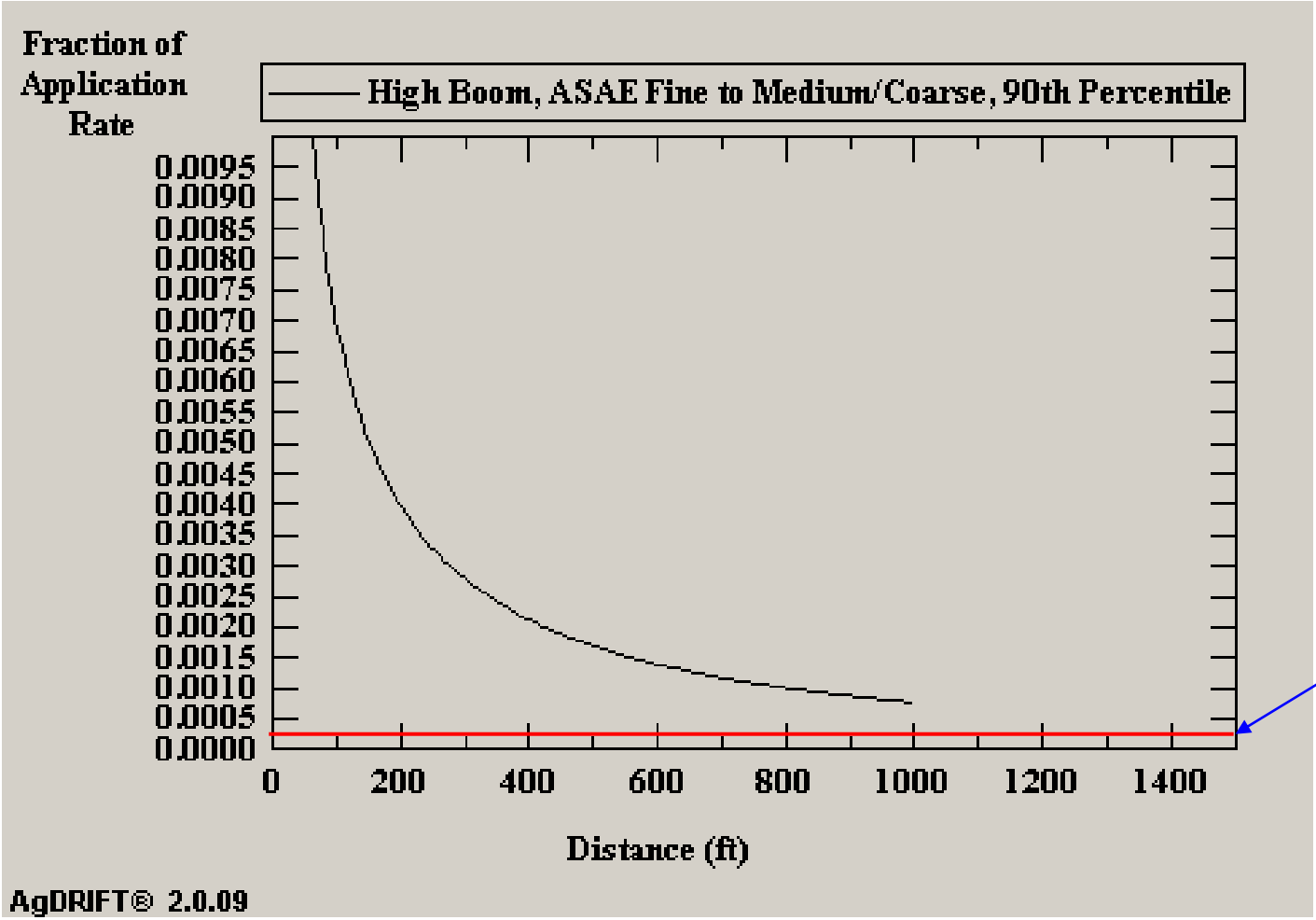
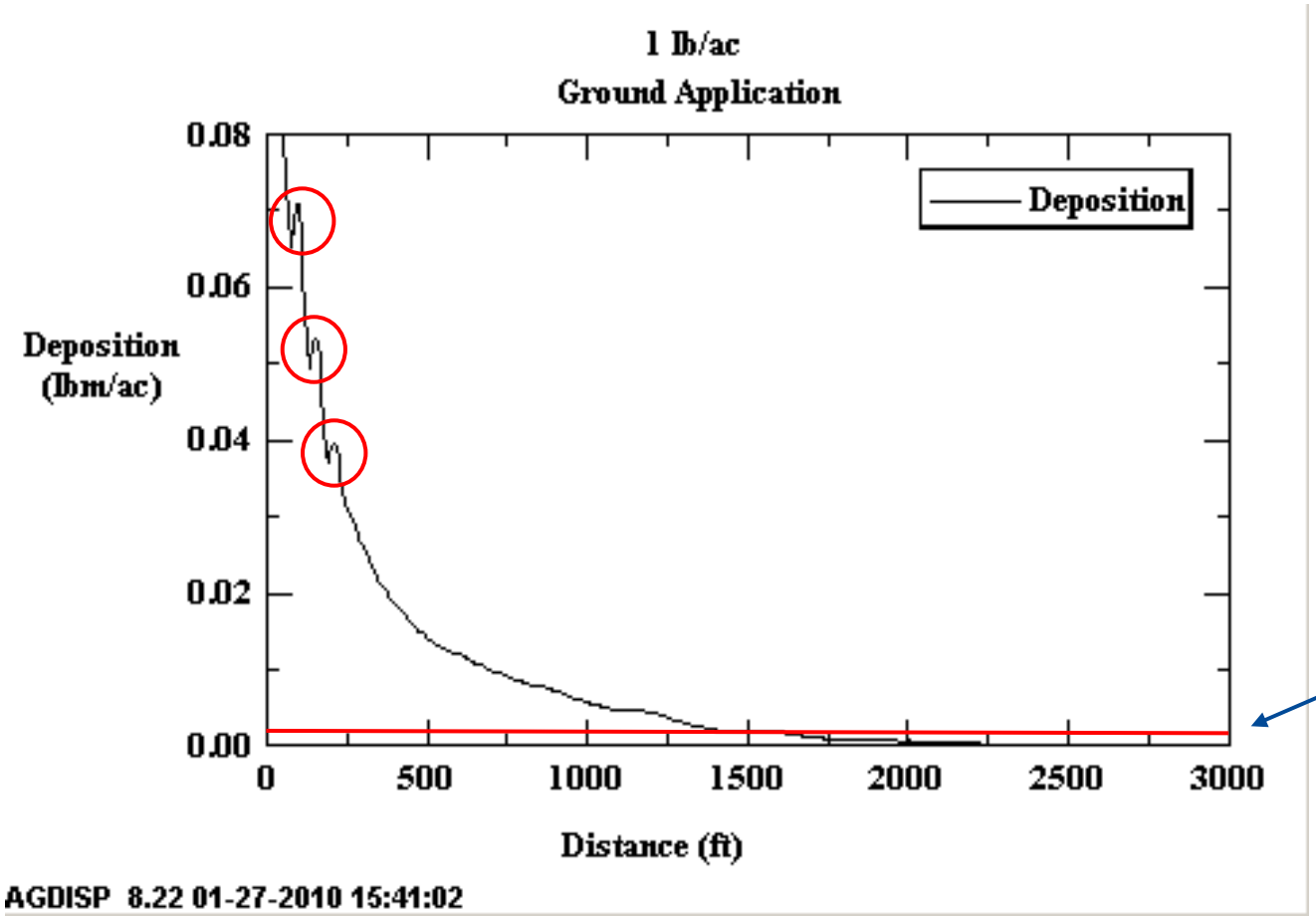
Example – AgDRIFT ASAE Med. - Course

Effect Concentration of 0.00026 lbs/ac



NOER from non-target plant study

Example – AGDISP ASAE Med. - Course Ground



NOER from non-target plant study

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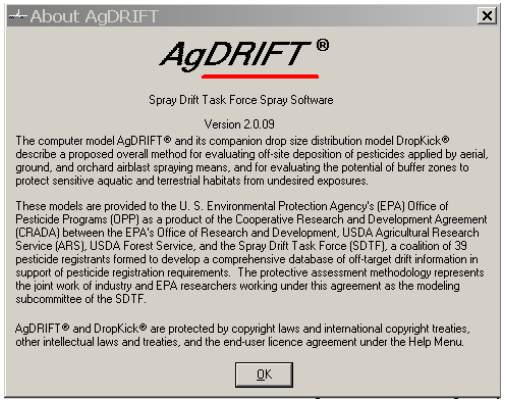
Model vs. Data

Vs



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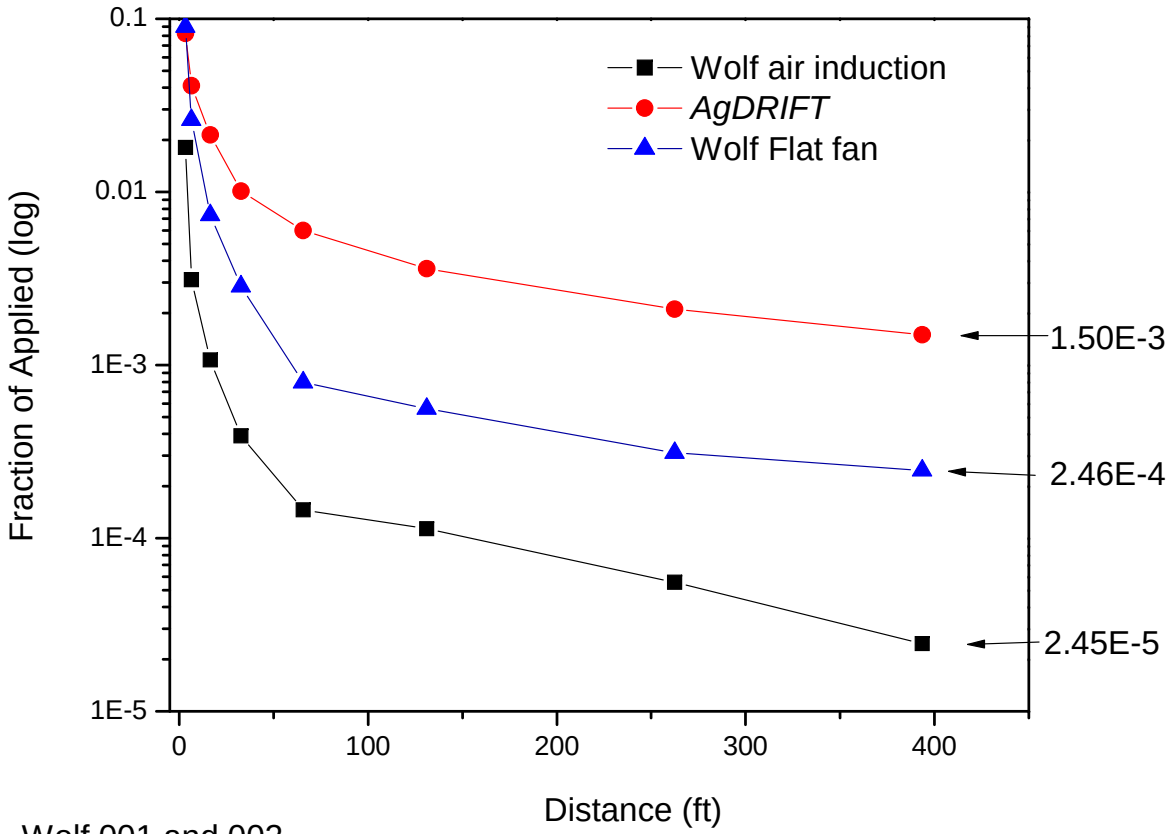
Model vs Data

AgDRIFT compared to Ag Canada's Data (Dr. Wolf)



AgDRIFT

Data – F. Fans

Data – Air Induct.

Wolf 001 and 002

Can predict DRT Effects

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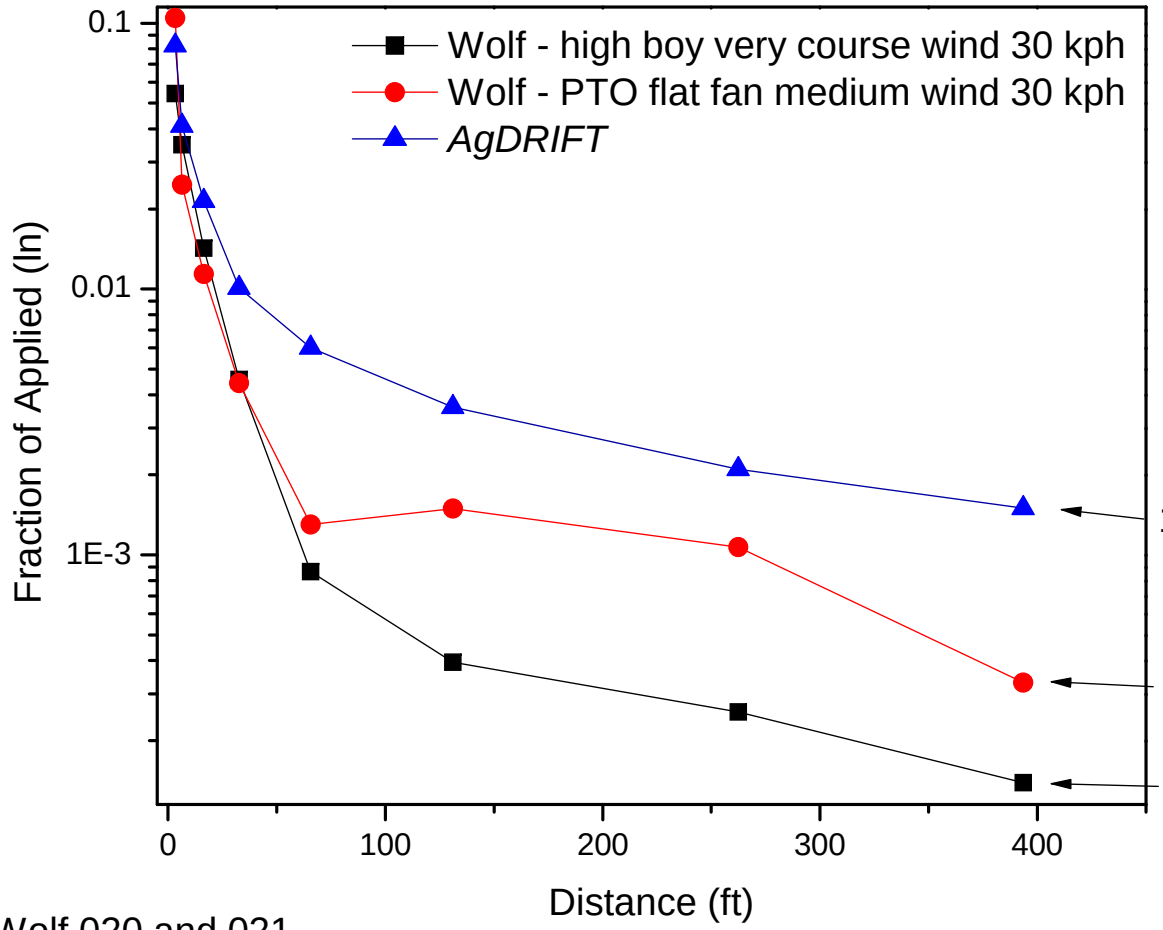
Model vs Data

AgDRIFT compared to Ag Canada's Data (Dr. Wolf)



(High Wind)

1.50E-3 AgDRIFT

3.31E-4 Data – F. Fans

1.39E-4 Data – Air Induct

Wolf 020 and 021

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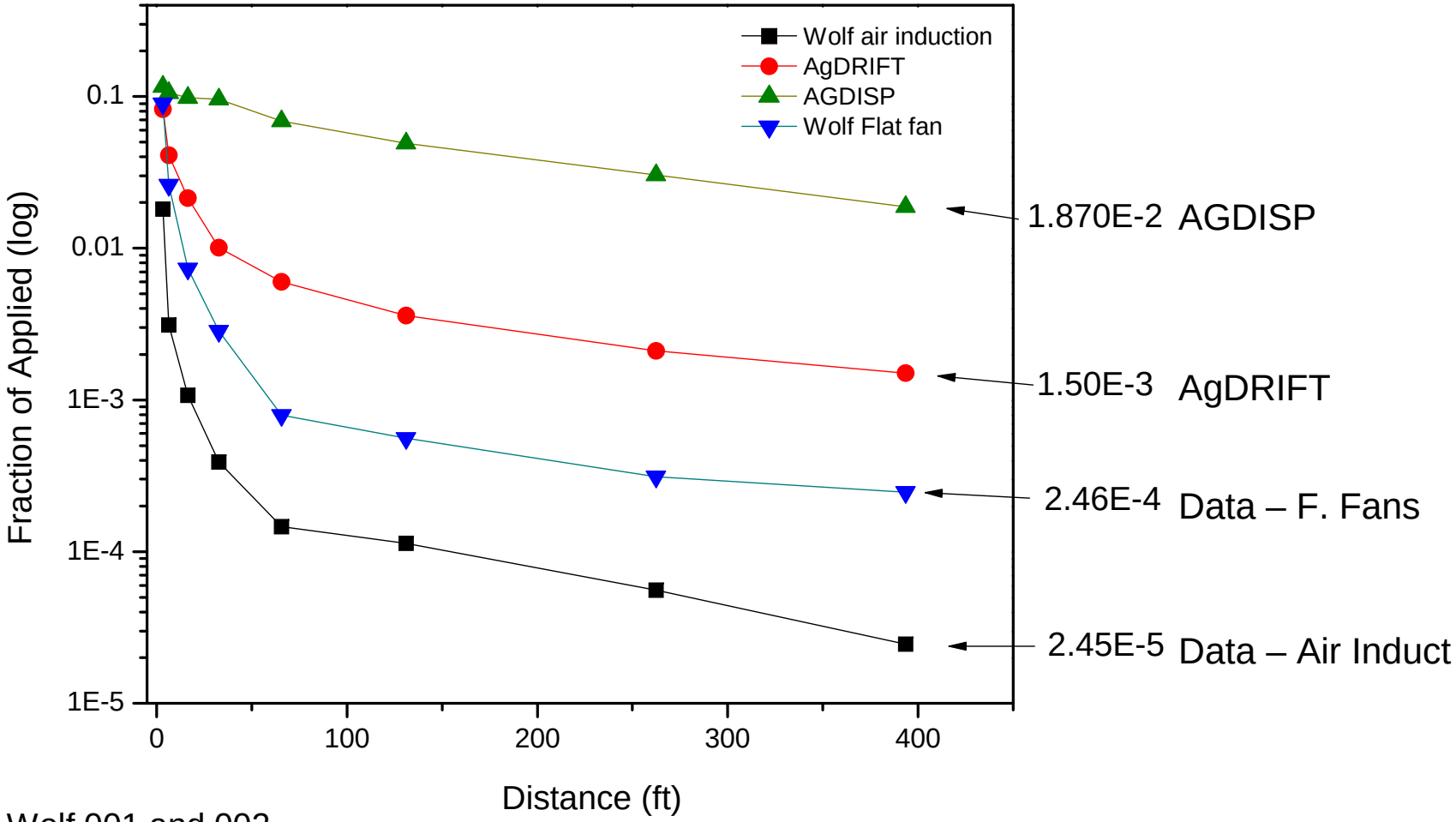
Model vs Data

AgDRIFT / AGDISP compared to Ag Canada's Data (Dr. Wolf)



Wolf 001 and 002

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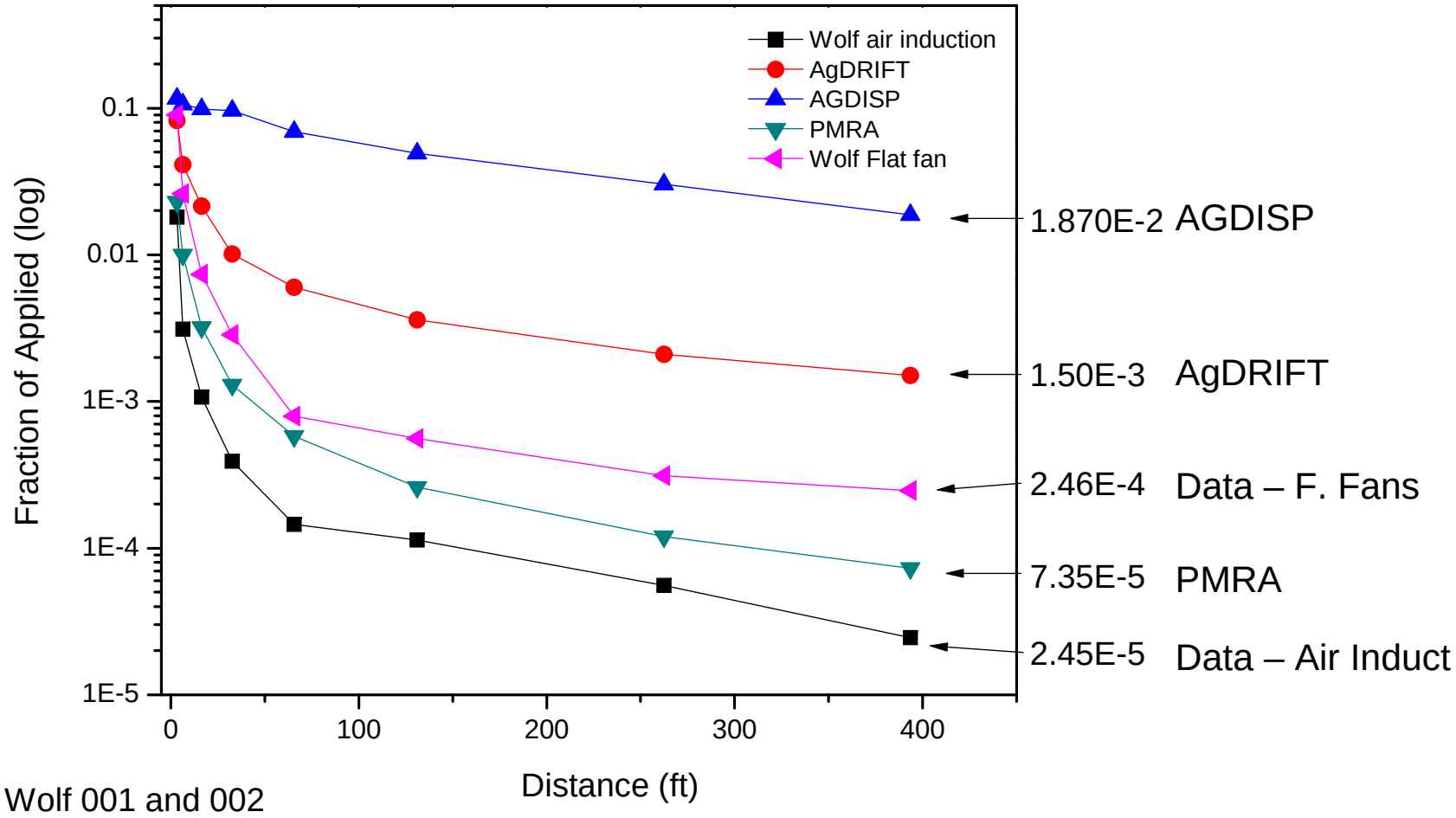
Model vs Data

AgDRIFT / AGDISP / EAD compared to Ag Canada's Data (Dr. Wolf)



Wolf 001 and 002

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Buffer Predictions

Rate (lb/ac)	MOA	pct	Boom Height	Droplet VMD_{50}	Model	Buffer (ft)
1.00	ground	90	50”	341	AgDRIFT	> 900
1.00	ground	N/A	60”	341	AGDISP	2300
1.00	ground	90	60 cm	385	PMRA EAD	130

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Summary

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Summary Comments

- Do greenhouse grown plants accurately represent plants in their natural setting (Hardened off)?
- Does a direct spray chamber spray accurately represent drift (or does it over dose)?
- Do Height, Dry Weight, Survival at the GS's observed really predict an outcome for a plant?
- Do AgDRIFT and AGDISP predict field data well (typically there is an order of magnitude difference)?

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PR Notice - Comments

- Labels will become larger since many tables will not to be created to cover the various rates and conditions for many products.
- Labels will have to be reviewed by both the state and federal agencies. BASF estimates that we might have as many as 100 labels that would have to be modified and thus reviewed by agencies.
- Since labels will become bigger, might there be more possibility for errors – e.g. selecting the wrong table by accident.

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Thank You !!