

Canopy Penetration and Deposition of Barrier Sprays from Electrostatic and Conventional Sprayers

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Background

- **Insecticidal barrier treatments**
To prevent insects from entering or damaging a building
- **Barrier treatments to vegetation**
potential to prevent insects from moving into an area surrounded by the treated vegetation.
- **Barrier treatments for insect control application**
localized application to vegetation or natural/man-made surfaces (resting place for mosquitoes)
- **The application technique**
intended to reduce not to eliminate the adult insect population.

Background

- Expected Benefits

timeliness

reduced cost

reduced pesticide use.

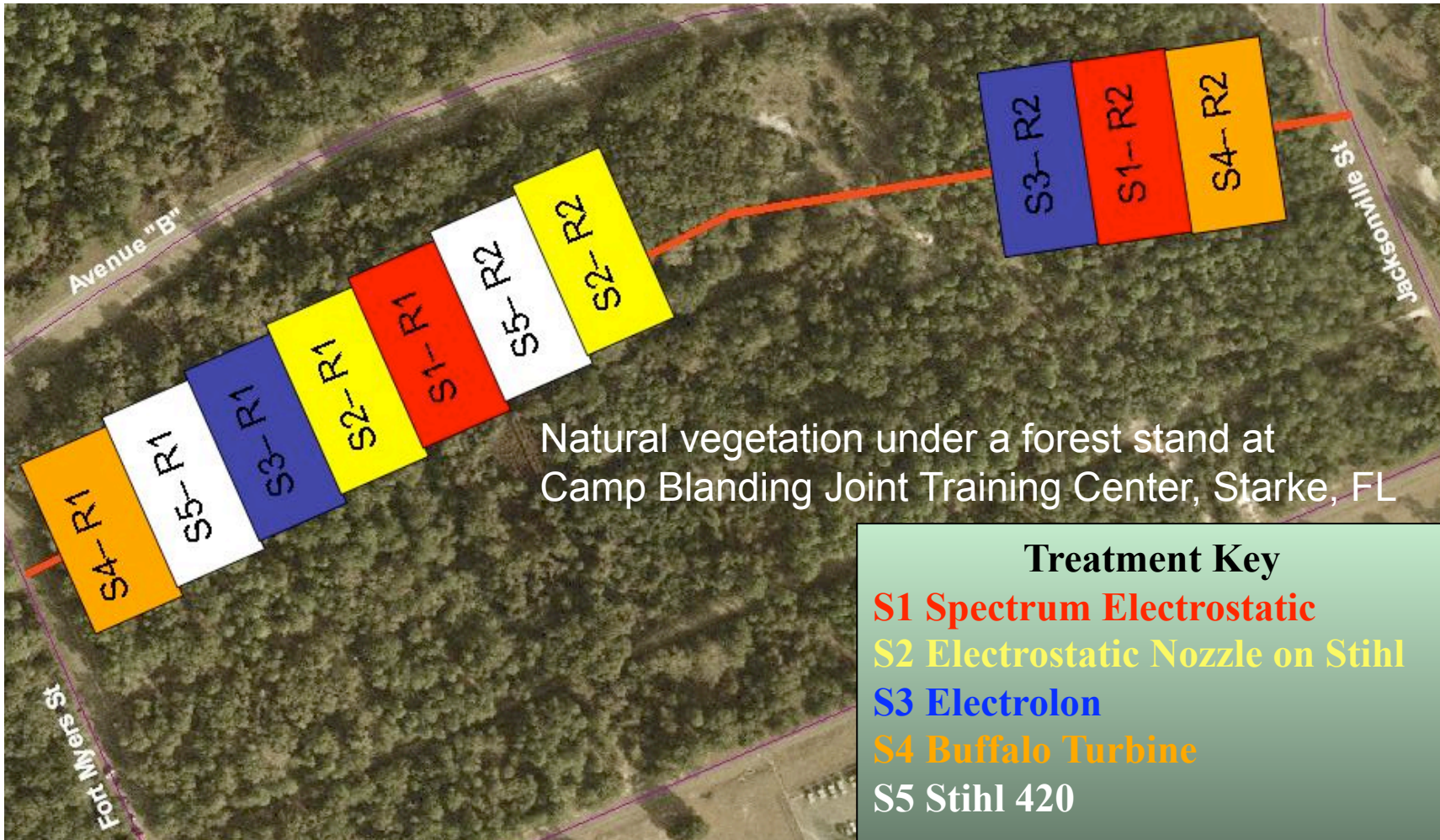
ULV sprays a name in public health spray application

Electrostatic is the talk of the time

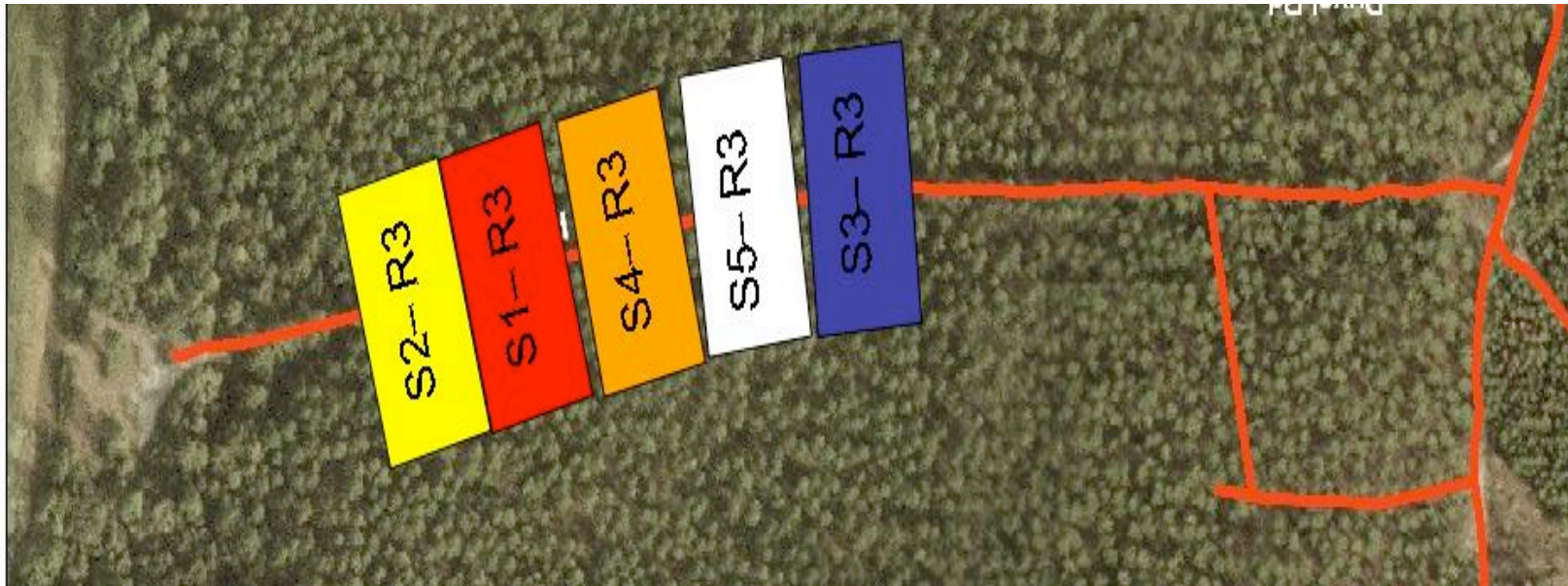
Objective

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- To evaluate the effectiveness of barrier sprays from electrostatic and conventional sprayers.
- Evaluation based on penetration and deposition

Site 1



Site 2



Treatment Key

- S1 Spectrum Electrostatic**
- S2 Electrostatic Nozzle on Stihl**
- S3 Electrolon**
- S4 Buffalo Turbine**
- S5 Stihl 420**

Buffalo Turbine mist sprayer (BUTU).



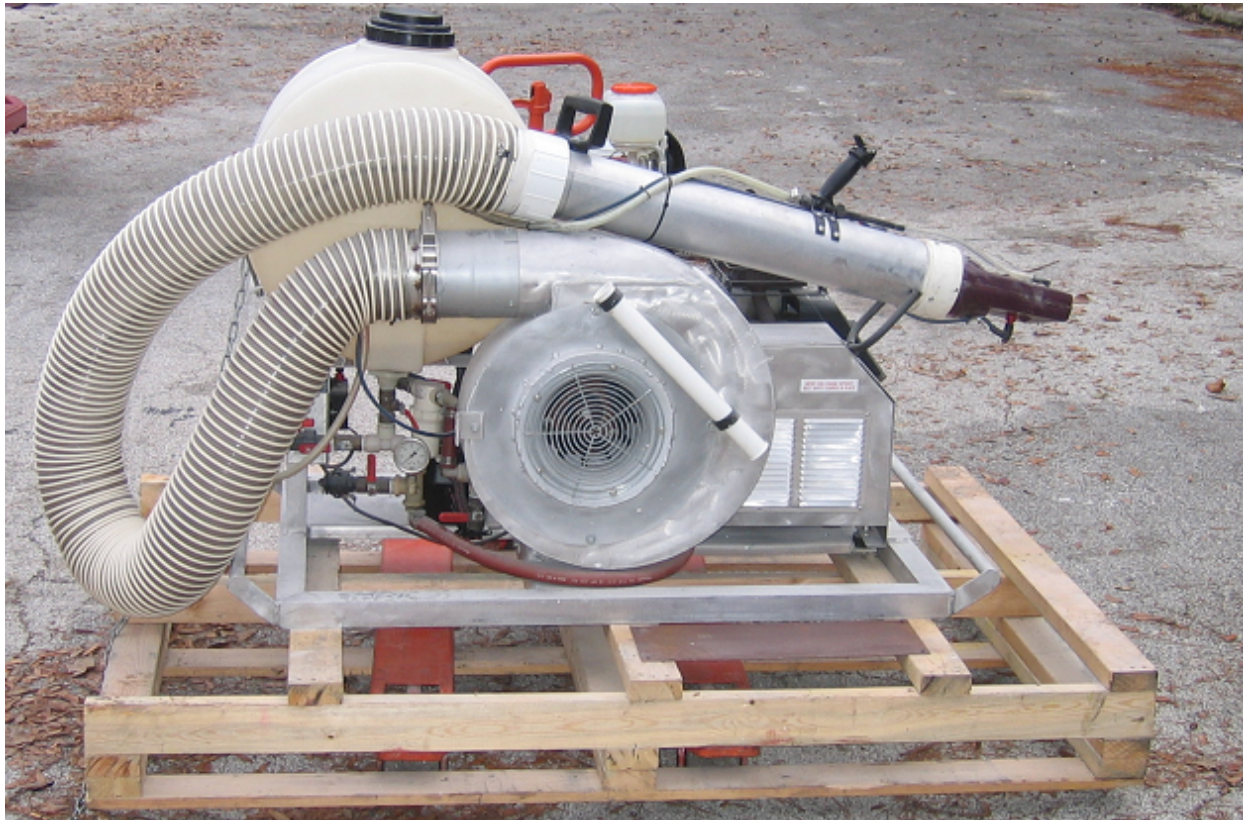
Truck/trailer mounted.
Four Teejet 8502 nozzles in a cluster
Flow rate up to 37.9 l/min

Electrolon BP-2.5TM (ELEC)

- electrostatic mist blower
- Battery operated induction charge nozzle.
- Flow rate 194 ml/min.



Spectrum Electrostatic Sprayer (SETM).



- Truck-mounted electrostatic mist sprayer
- Droplet charging by conduction
- Flow rate up to 26.5 l/min

Stihl 420 (STHL)

Backpack mist blower

Flow rate: 0.14 – 3.0 l/
min.



Spectrum Electrostatic Nozzle on Stihl (SENS)



Weather Conditions

Sprayer	Wind Speed (Range), km/h	Temperature (Range), °C	R.H. (Range), %
BUTU	1.2 (0.0 – 2.4)	29.7 (28.2 – 31.1)	59 (50 – 69)
ELEC	1.9 (1.5 – 2.4)	29.5 (28.3 – 30.8)	60 (49 – 71)
SENS	0.7 (0.0 – 1.5)	30.1 (28.3 – 32.0)	61 (53 – 69)
SETM	3.9 (3.9 - 4.0)	29.7 (28.0 – 31.4)	61 (49 – 73)
STHL	2.7 (0.8 – 3.7)	29.9 (27.2 – 32.3)	63(49 – 72)

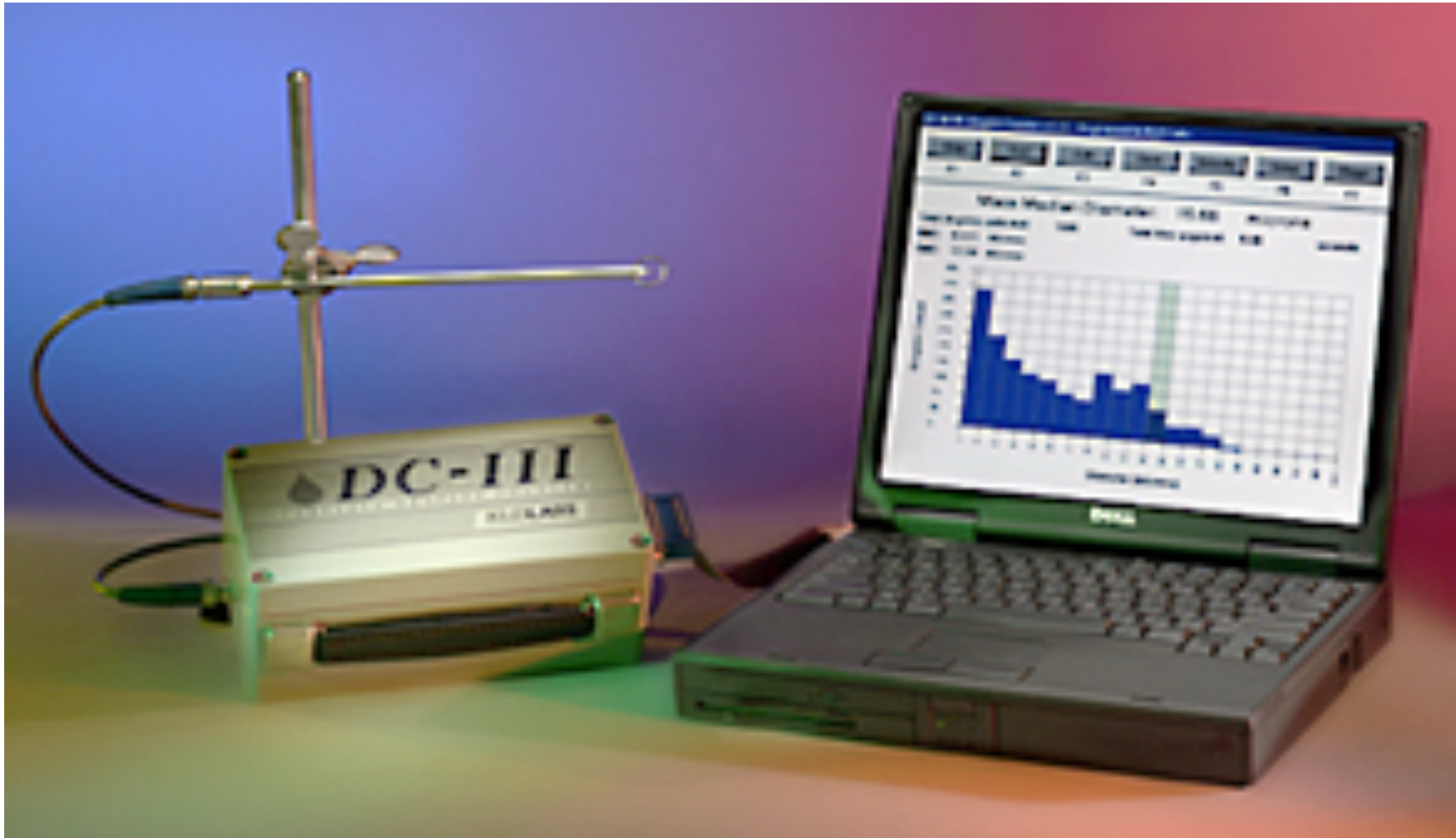
Spray Material

- TalstarTM (7.9 % Bifenthrin)
- Application rates of 21.8 ml/300 m of treated row
- Caracid Brilliant Flavine FFS fluorescent dye

Application parameters and Tank Mixes

Sprayer	Flow rate L/min	Travel Speed km/h	Insecticide ml/L	Dye g/L	Sprayer Air Velocity (m/s) 61 cm away
BUTU	4.67	8.0	2.11	1.91	30.5
ELEC	0.20	3.2	19.70	17.77	0.7
SENS	0.84	3.2	4.69	4.23	29.3
SETM	6.75	8.0	1.46	1.32	31.0
STHL	2.77	3.2	1.42	1.28	30.3

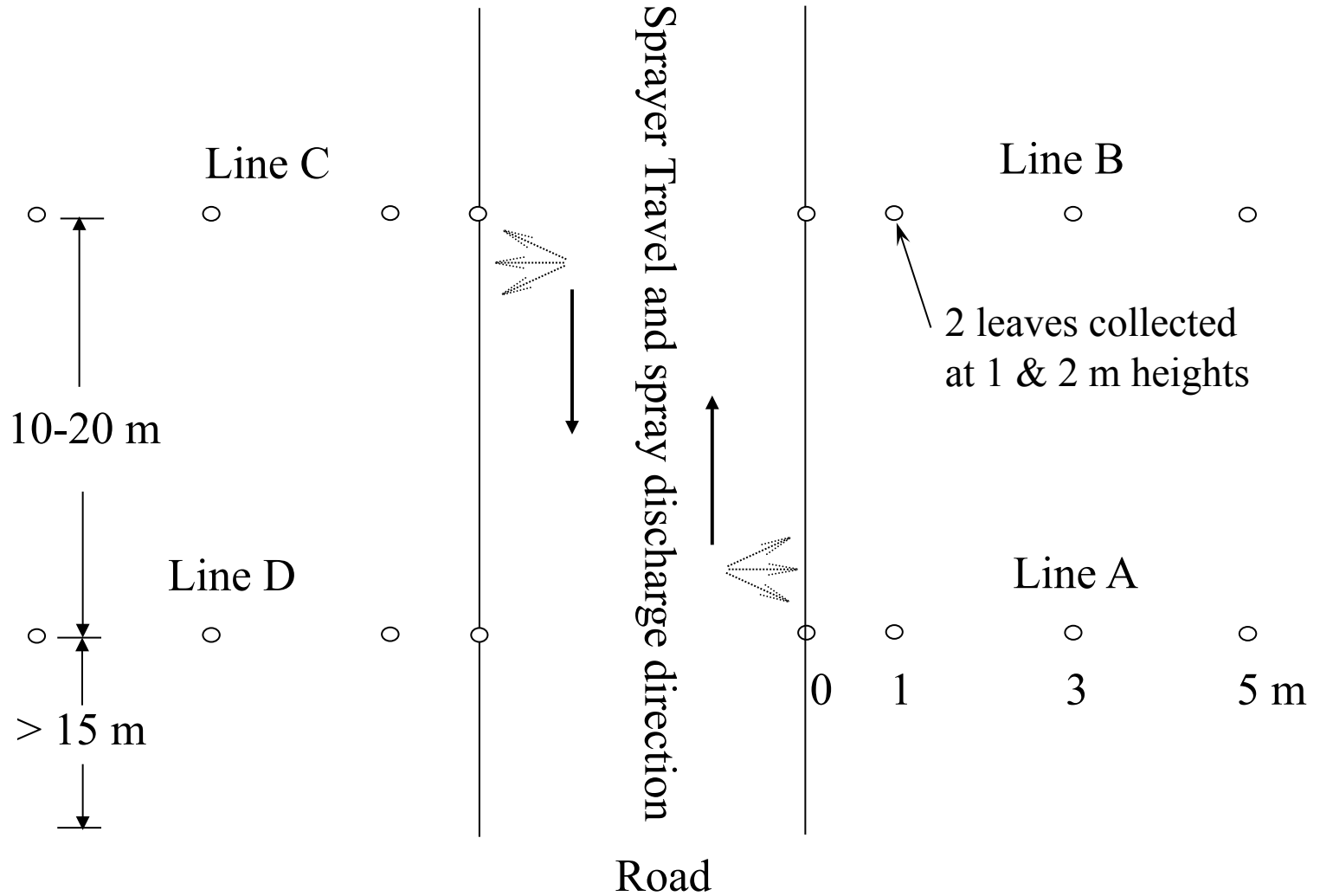
Hotwire Droplet Sizing



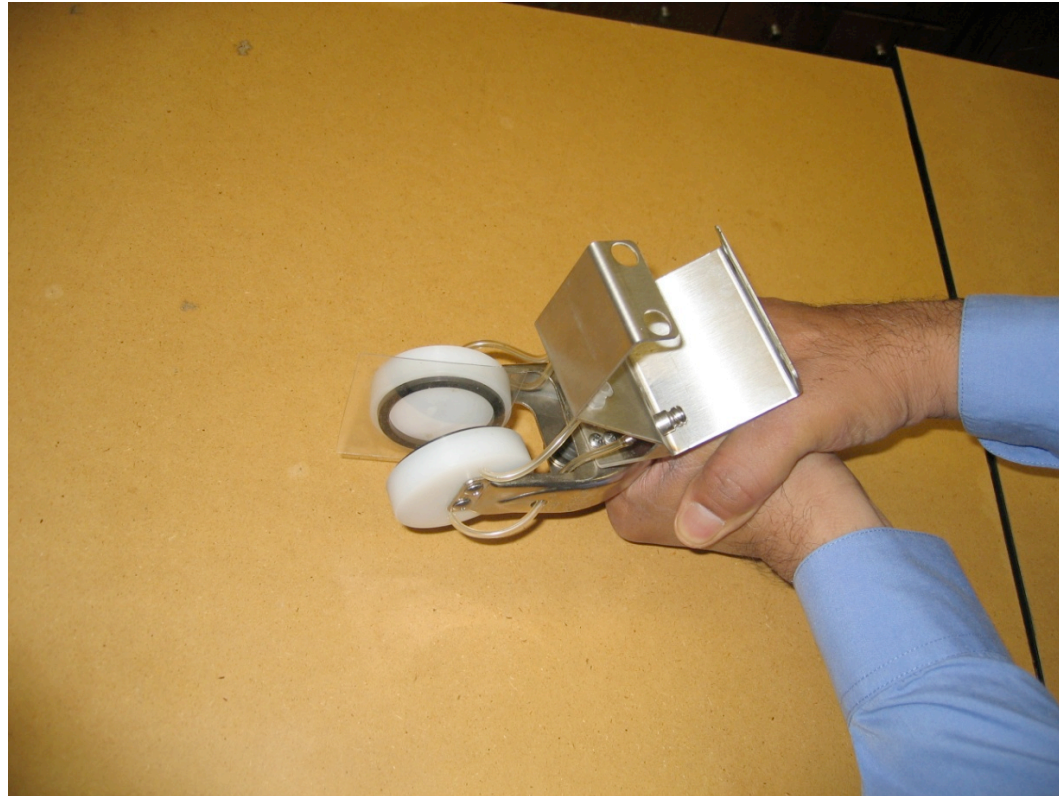
Droplet Characteristics

Sprayer	$DV_{0.1}$ ($\mu\text{m} \pm \text{SD}$)	$DV_{0.5}$ ($\mu\text{m} \pm \text{SD}$)	$DV_{0.9}$ ($\mu\text{m} \pm \text{SD}$)	% Vol <50 μm
BUTU	97.0 \pm 28.1	204.7 \pm 56.9	375.5 \pm 98.7	2.3 \pm 2.1
ELEC	12.9 \pm 3.9	49.7 \pm 18.8	117.9 \pm 36.7	50.7 \pm 13.0
SENS	53.3 \pm 6.9	135.4 \pm 10.0	216.0 \pm 44.2	8.7 \pm 2.6
SETM	80.7 \pm 4.1	186.3 \pm 4.7	414.7 \pm 110.1	4.2 \pm 1.1
STHL	63.3 \pm 14.8	162.7 \pm 32.6	285.9 \pm 126.8	7.0 \pm 2.9

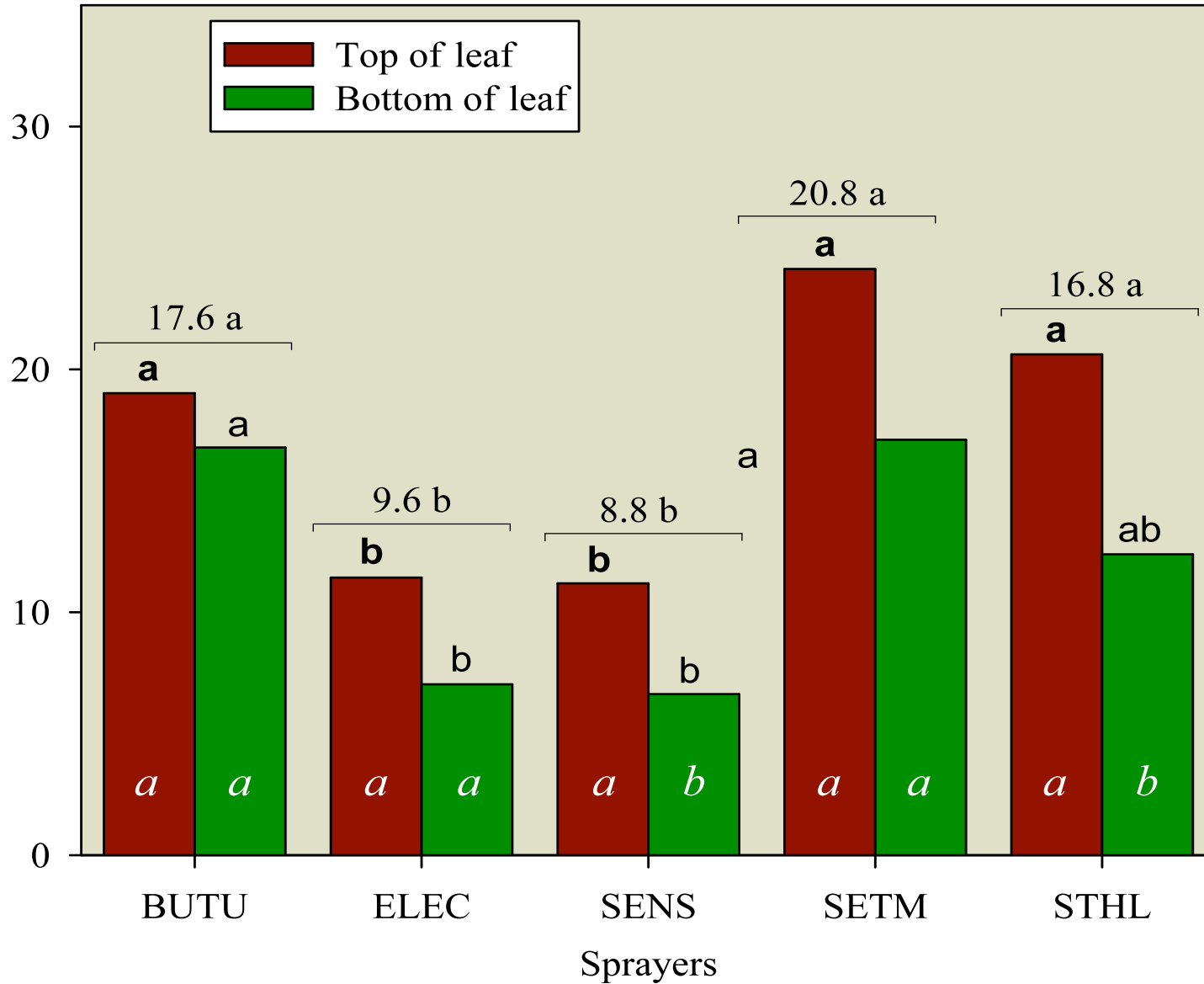
Sampling Locations



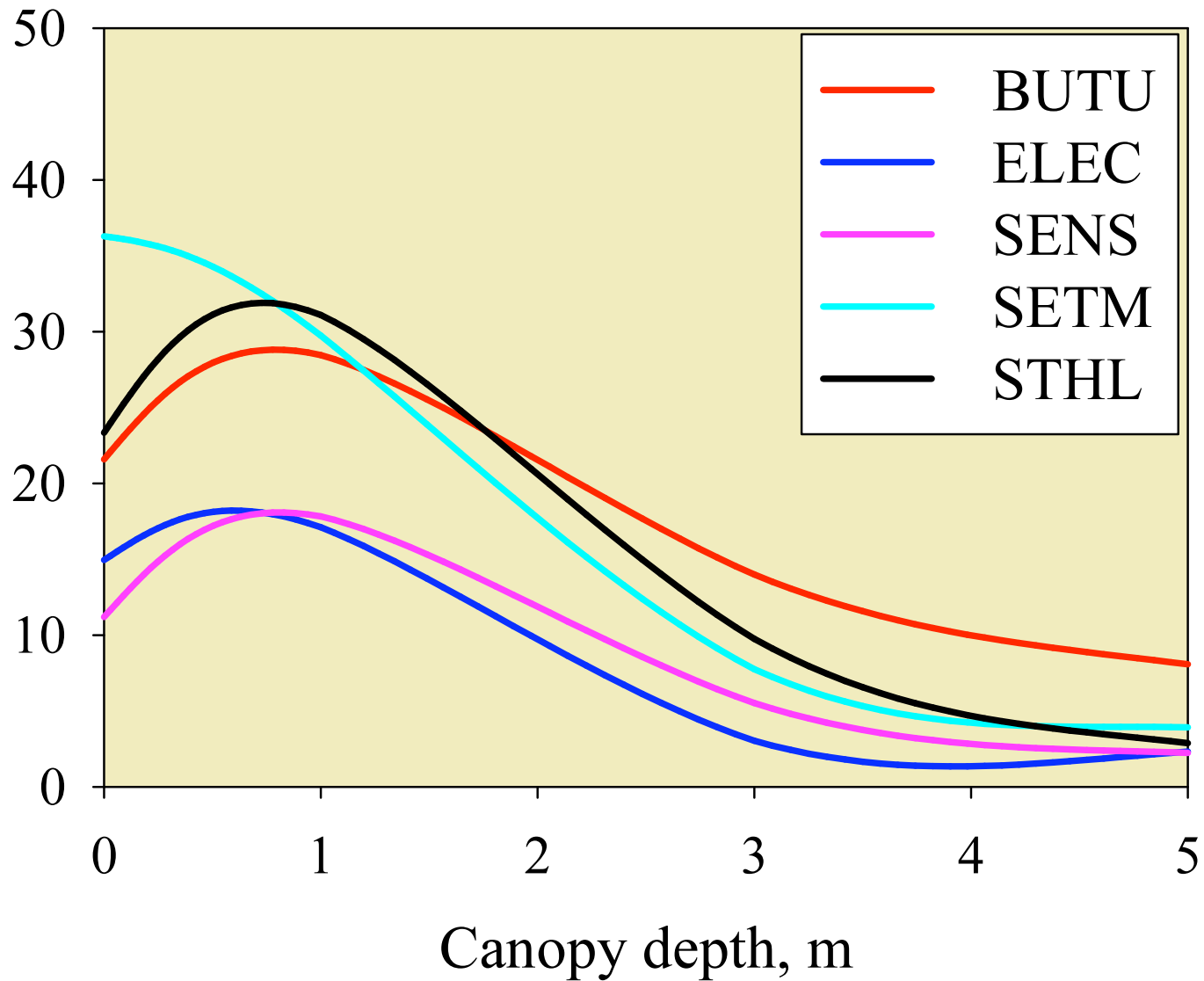
Leaf Washing



Mean Deposition



Penetration



CONCLUSIONS

- Sprayers producing larger droplets proved significantly better.
- Sprayers with higher air velocity at the nozzle discharge proved significantly better.
- Electrostatic sprayers have no improvement over the conventional sprayers.
- No difference between truck mounted and back pack sprayers. => Selection based on area to be treated.

ACKNOWLEDGMENTS

For grant from the Deployed War-Fighter Protection (DWFP) Research Program, funded by the U.S. Department of Defense through the Armed Forces Pest Management Board (AFPMB).