



**PROTECT HORTICULTURAL CROPS AND ECOSYSTEMS
WITH SUSTAINABLE INTELLIGENT VARIABLE-RATE
SPRAY TECHNOLOGY THAT RETROFITS ONTO EXISTING
SPRAYERS**

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Gary Vandebark – Chief Engineer, Smart Apply®, Inc.



AGRITECH DAY
By AXEMA

Who are we?



Steve Booher

AS Design, BS Business Management
Founder and Chairman, Smart Apply®, Inc.



Gary Vandebark

AS Mechanics, BS Mechanical Engineering
Chief Engineer, Smart Apply®, Inc.

Summary

1. Video Overview - Intelligent Spray Control System™
2. Materials and Methods
3. Field Trails
4. Conclusion
5. Q & A

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Video Overview - Intelligent Spray Control System™



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1. Video Overview

Intelligent Spray Control System™



1. Video Overview

Intelligent Spray Control System™



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Materials and Methods



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2. Materials and Methods

Component Overview



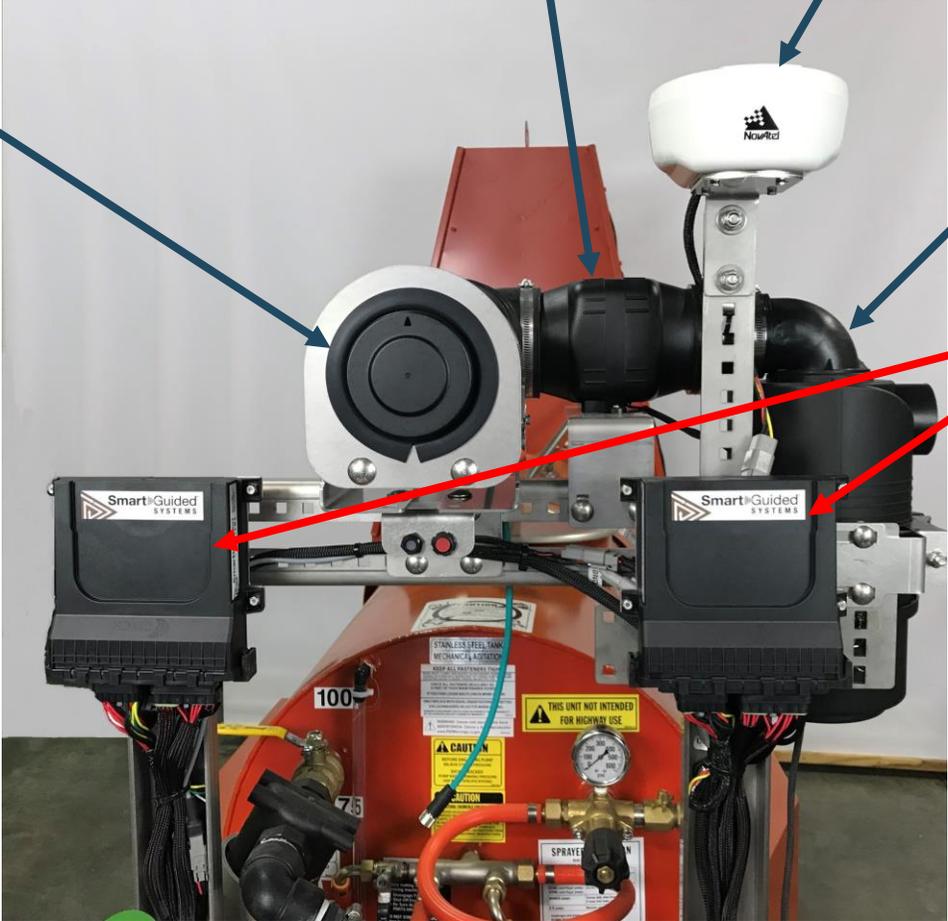
LIDAR (Laser)



Rugged Android Tablet



Nozzle Solenoids



Blower Fan

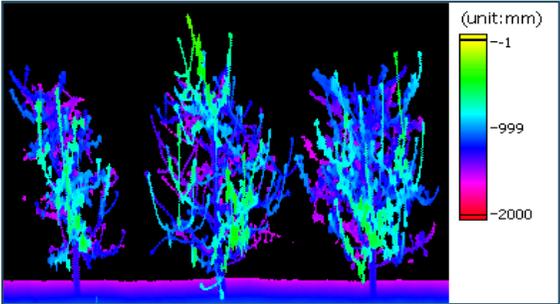
GPS for Speed and Coverage Maps



Air Filtration for LIDAR Lens



Controllers for Spray Nozzles



Algorithm's for Calculating Spray Volume

2. Materials and Methods

Retrofit any Sprayer



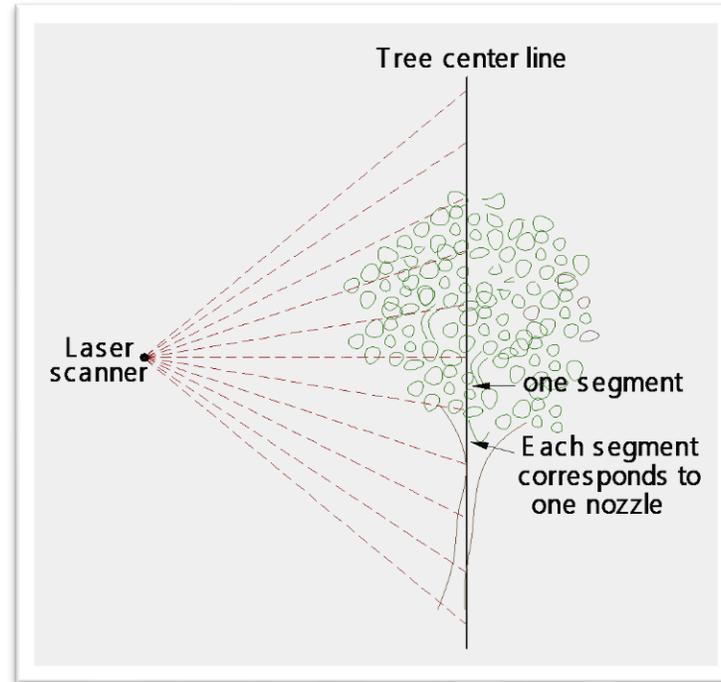
2. Materials and Methods

LiDAR Scanning

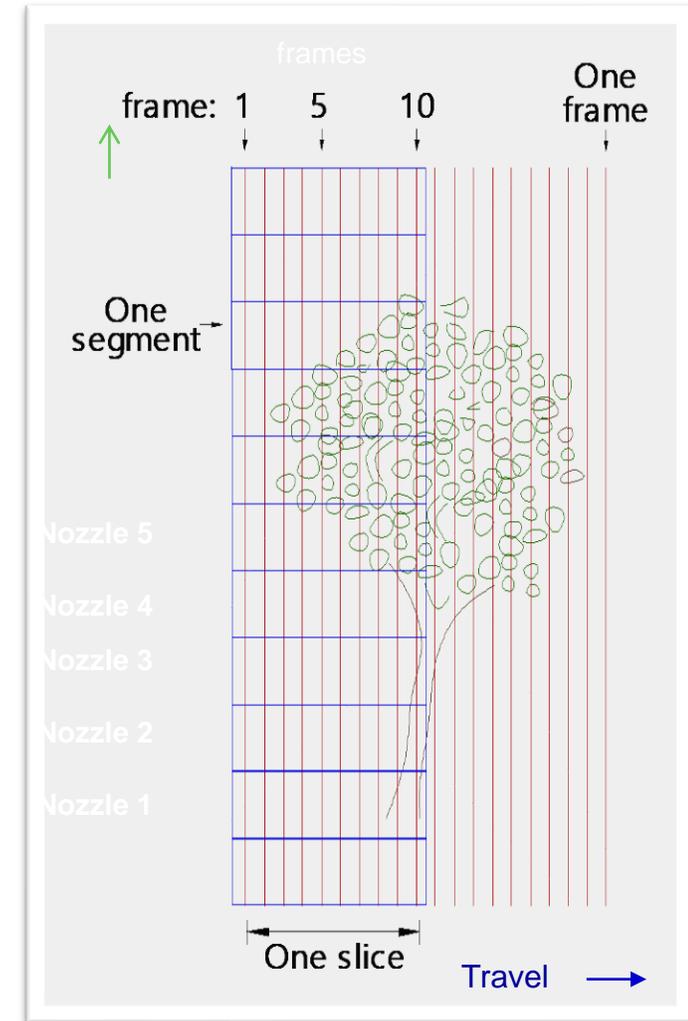


**270° radial,
60-m range**

**27,000 points per
second**

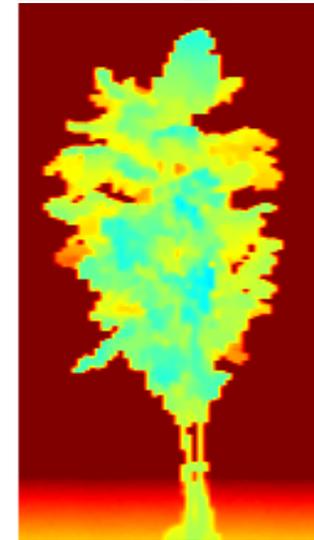
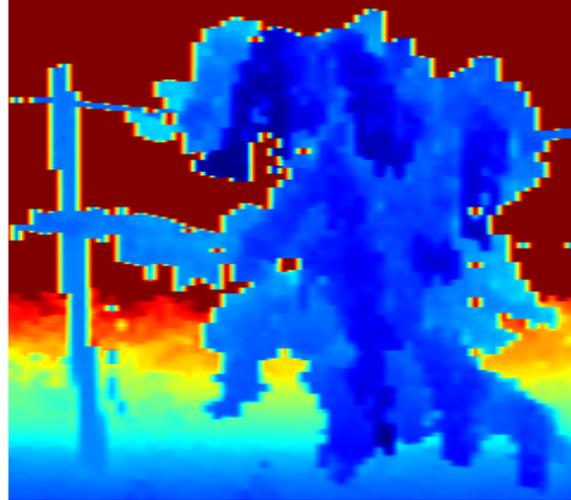
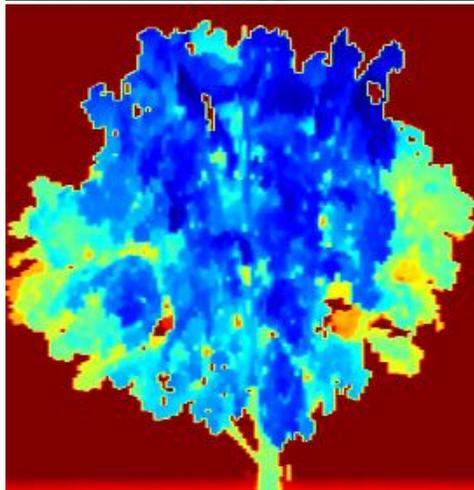


**Convert point-to-point
distances to surface structures**



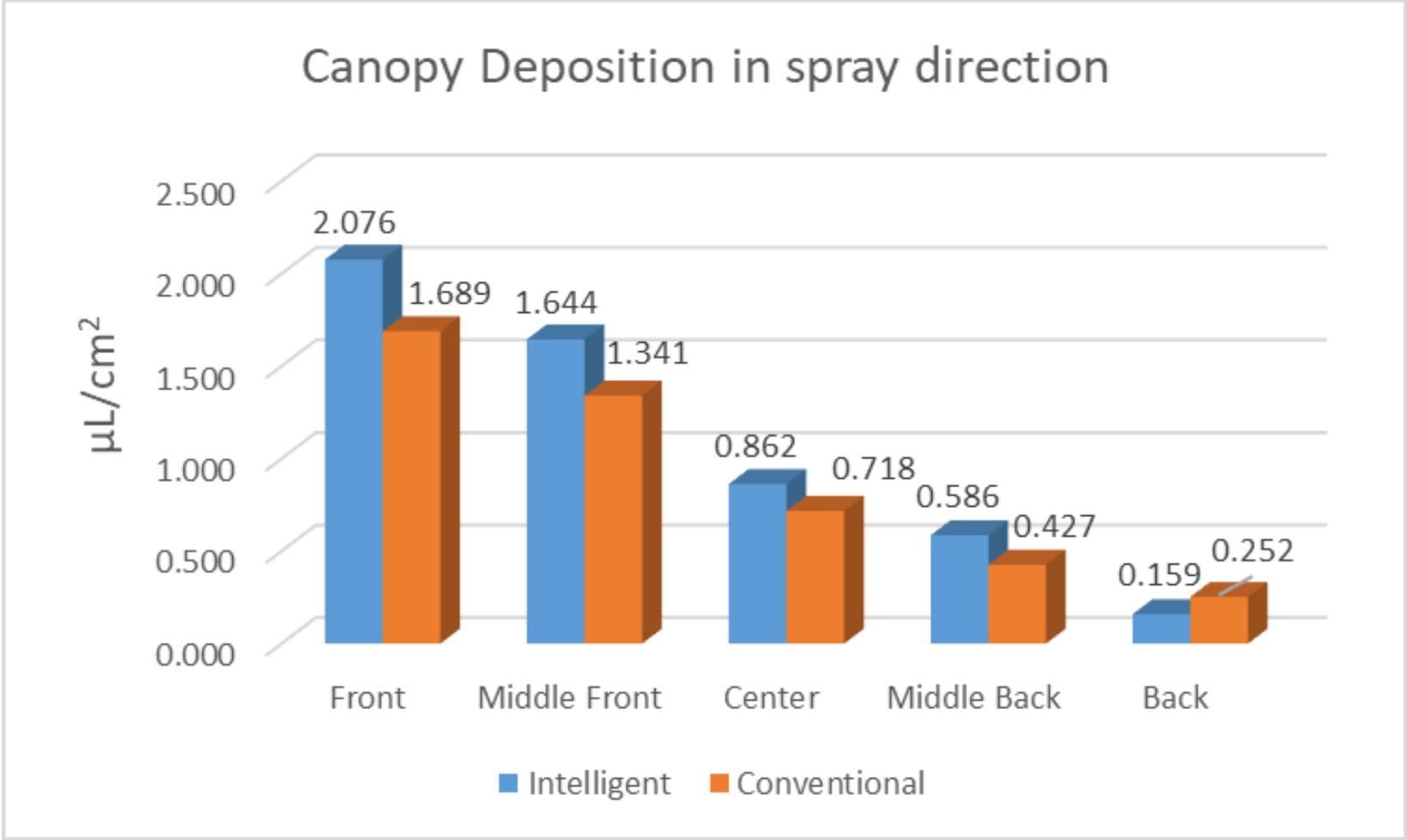
2. Materials and Methods

Actual Scans



2. Materials and Methods

Coverage Comparison



Source: Dr. Zhu USDA

2. Materials and Methods

Crop Types

Fruit Crops

Apples
Blueberries
Citrus
Lemons
Pears
Peaches
Raspberries

Nut Crops

Almonds
Hazelnuts
Pecans
Pistachios
Walnuts

Other

Vineyards
Hops

Countries

USA
Canada
Australia
New Zealand
India
Peru
Chile
Switzerland
Netherlands
South Africa

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Results



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4. Results

By Crop Type (USA data)

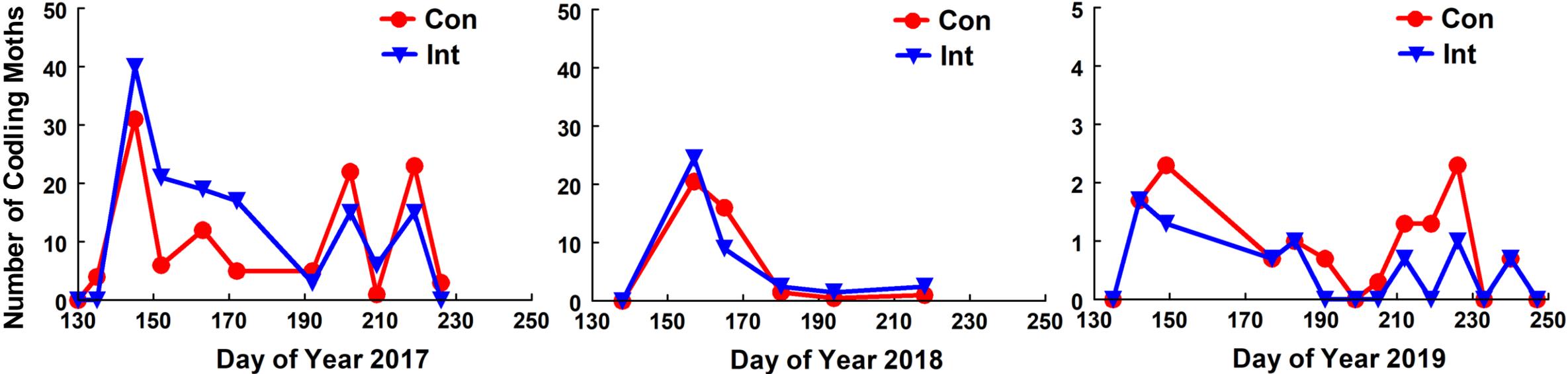
Year	Spray Volume Reduction (%)			
	Apple	Peach	Blueberry	Raspberry
2017	64.8	23.7	44.4	49.4
2018	52.3	34.0	50.6	56.7
2019	32.1	32.0	55.7	55.3

Year	Chemical Cost Saving (U.S. dollars per hectare)			
	Apple	Peach	Blueberry	Raspberry
2017	2429	151	722	289
2018	1866	544	714	200
2019	974	437	855	131

Source: Dr. Zhu USDA

4. Results

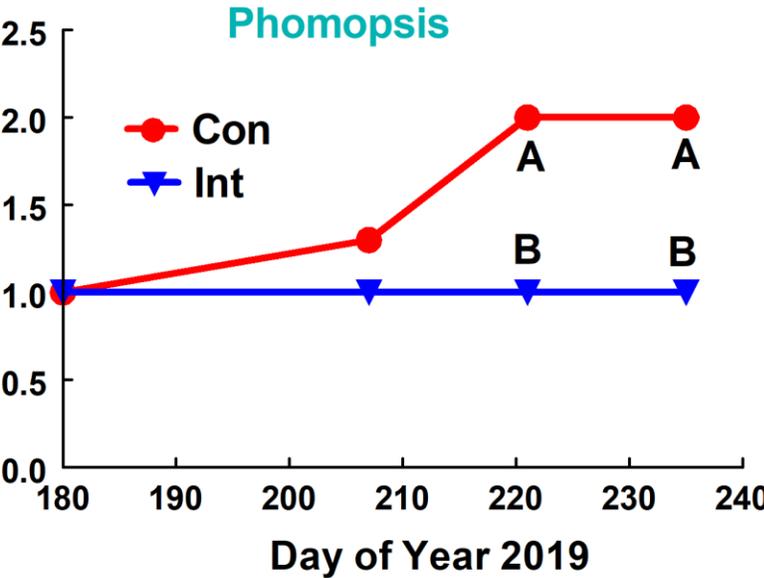
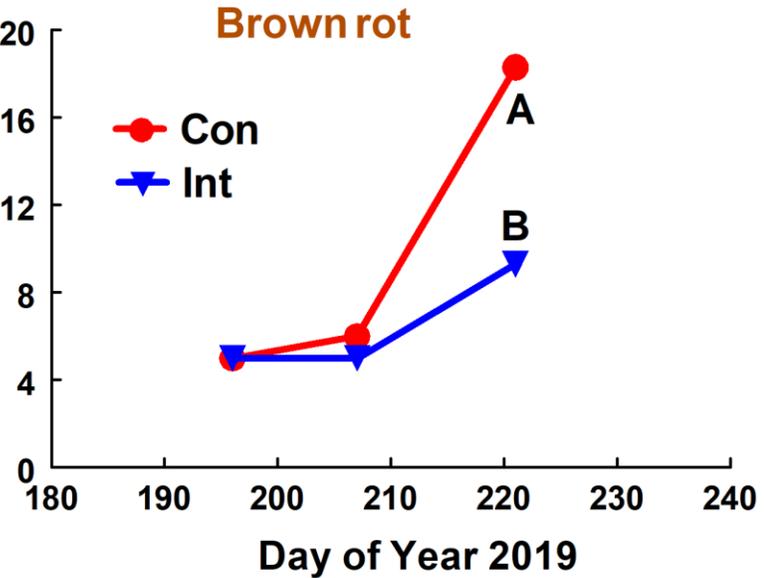
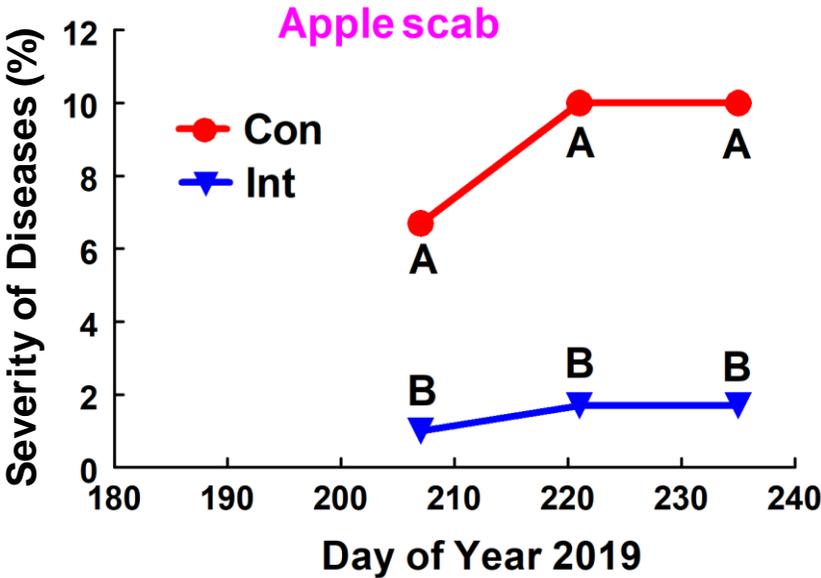
Apple Plot



Source: Dr. Zhu USDA

4. Results

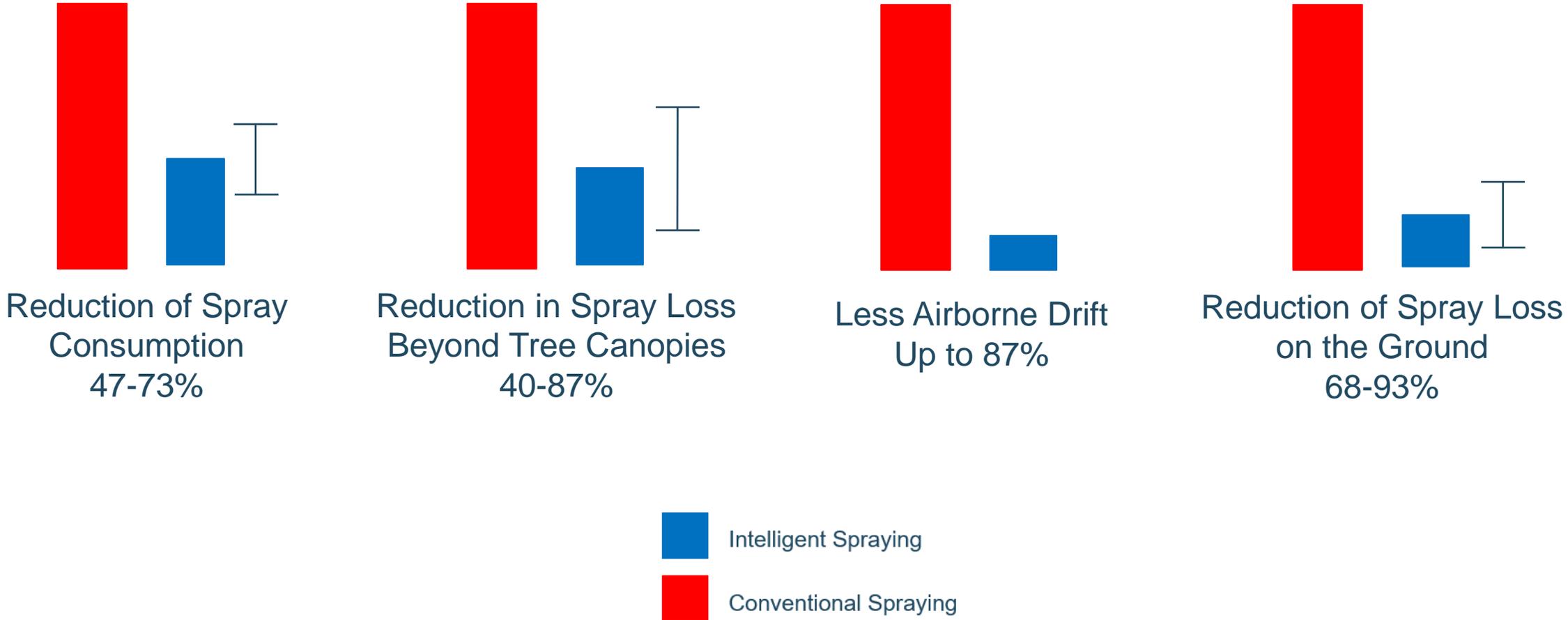
Apples | Peaches | Blueberries



Source: Dr. Zhu USDA

4. Results

Spray Reduction



Source: Dr. Erdal Ozkan, The Ohio State University

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Conclusion

5. Conclusion

Smart Apply® Intelligent Spray Control System™

- **60% Average Reduction in Spray Volume**
- **Up To 87% Less Airborne Drift**
- **Up To 93% Less Spray Loss on the Ground**
- **Equal or Better Crop Protection**
- **Digital Crop or Tree Inventory**
- **Prescription Spray by Boundary**
- **Adapts to New & Existing Sprayers**

Smart Apply[®]

Intelligent Spray Control System[™]

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QUESTIONS & ANSWERS