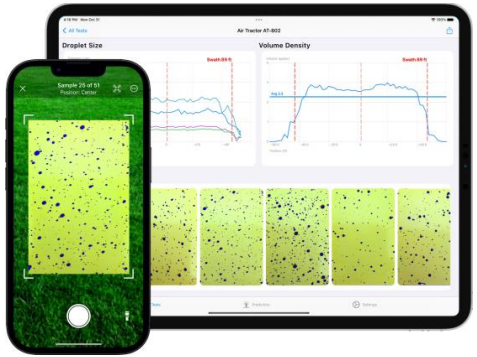
DropFlight

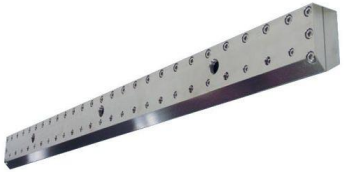
Pattern Testing: Droplet Size Matters

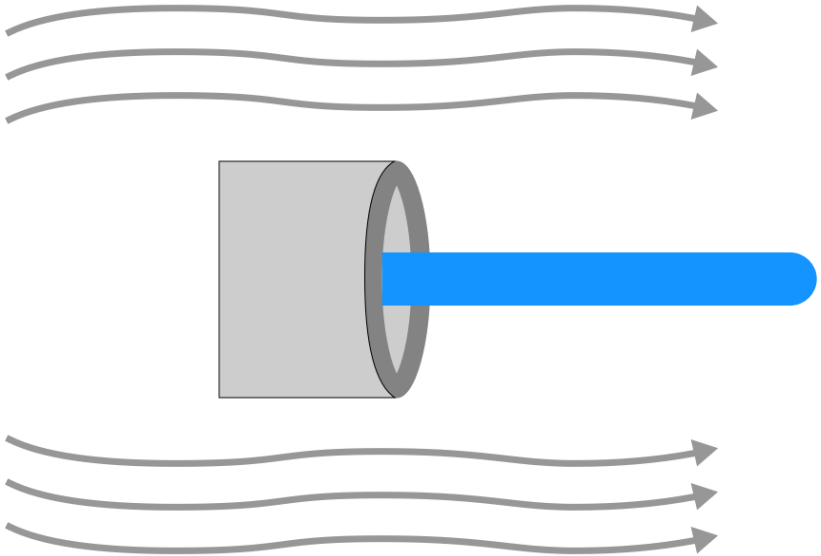


Collin Hundley
Robert Ching

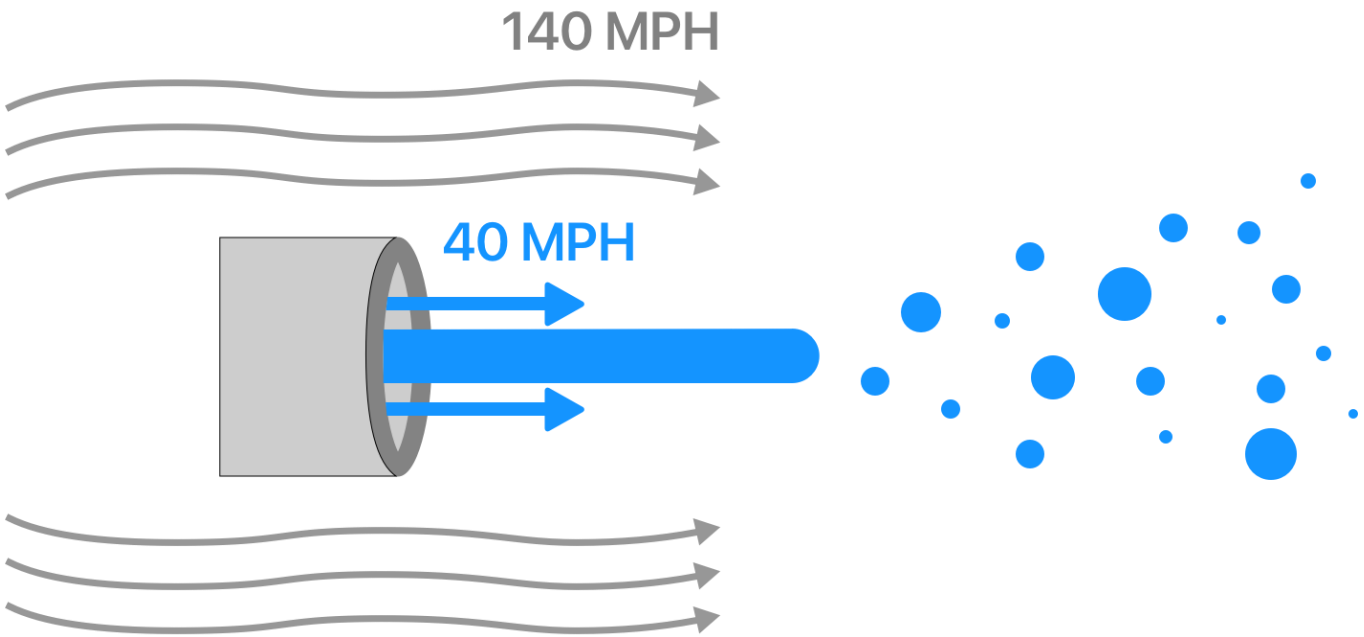
What would the

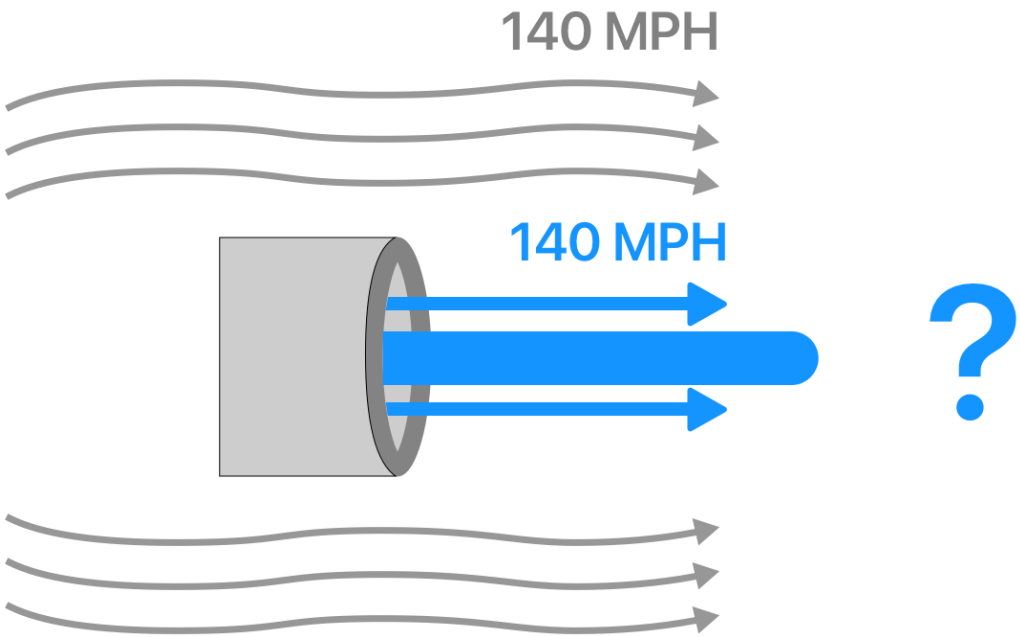
perfect nozzle provide?





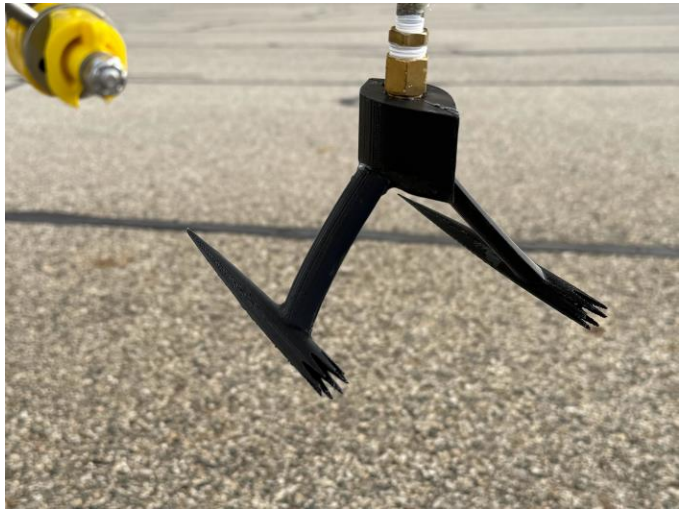
Straight Stream Nozzle

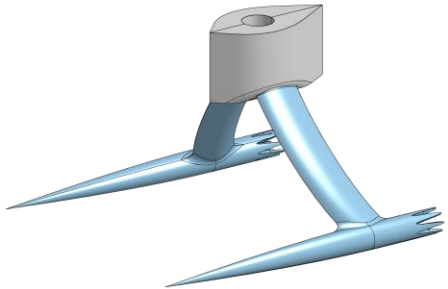

140 MPH
40 MPH

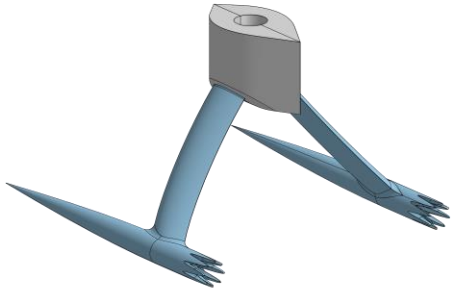

140 MPH
140 MPH
?

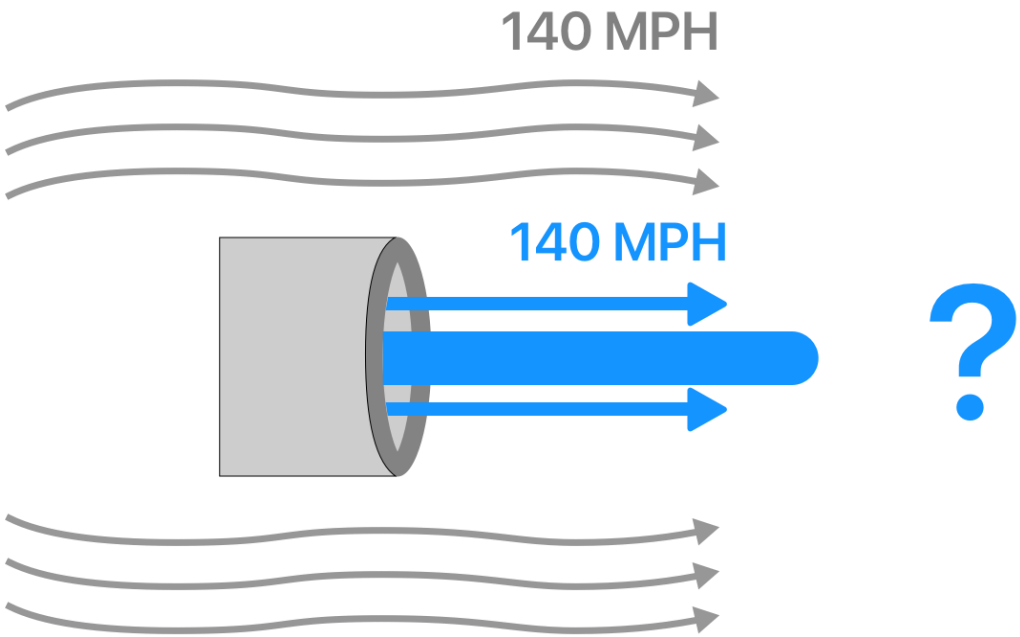

Credit: MythBusters

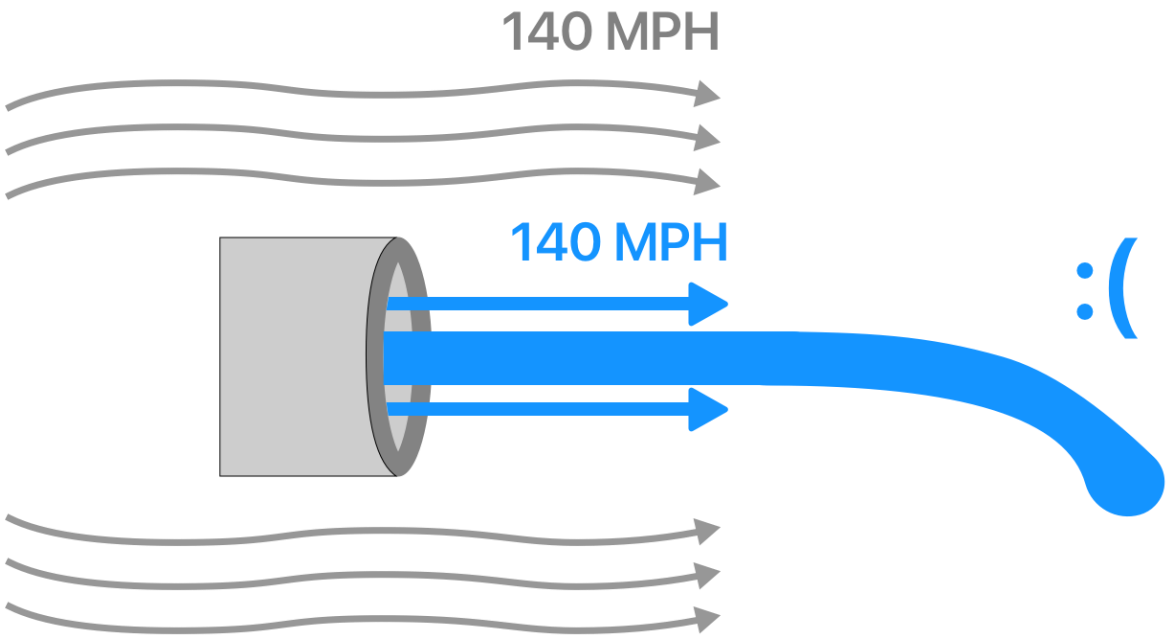
Nozzle

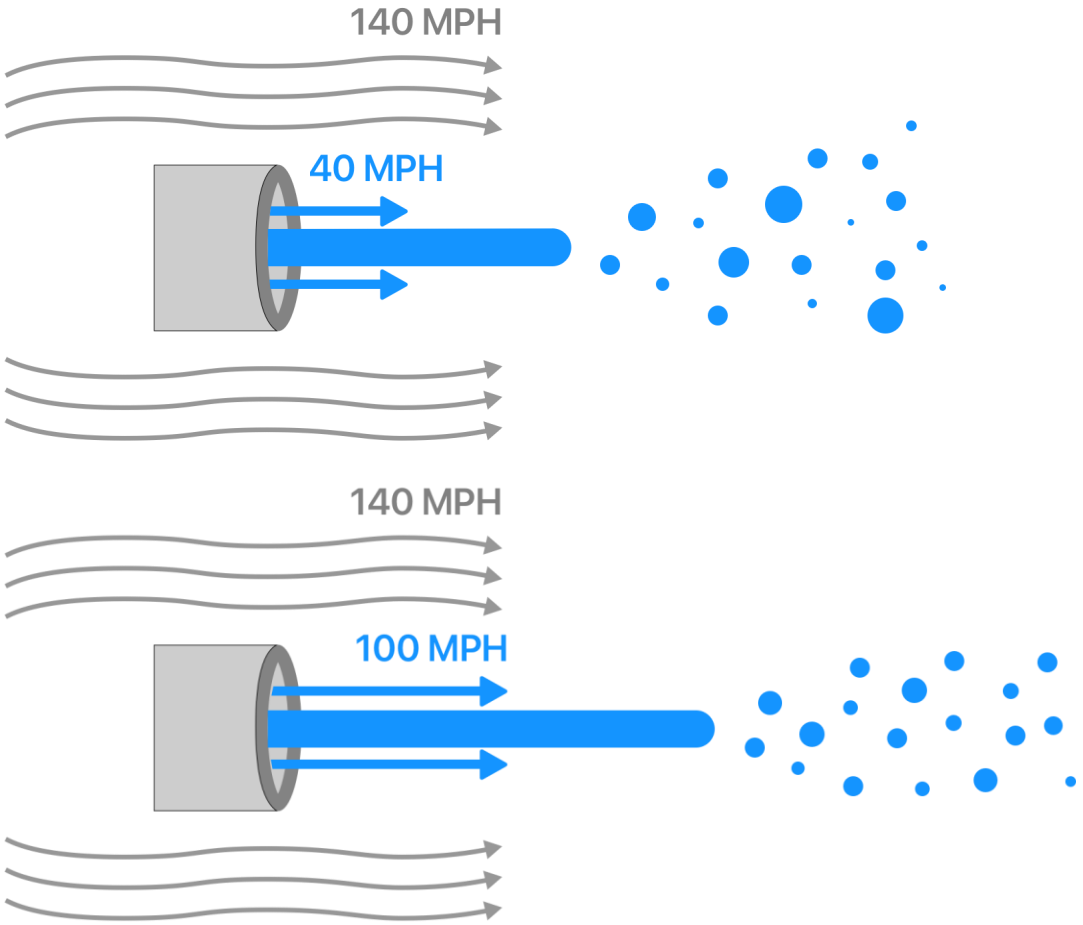




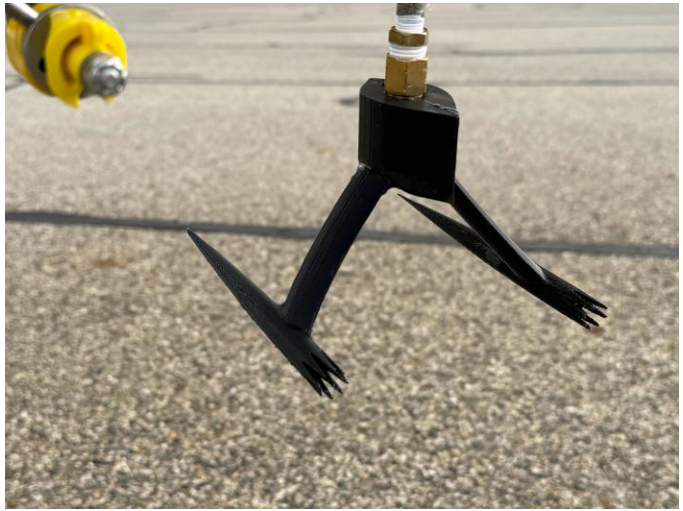


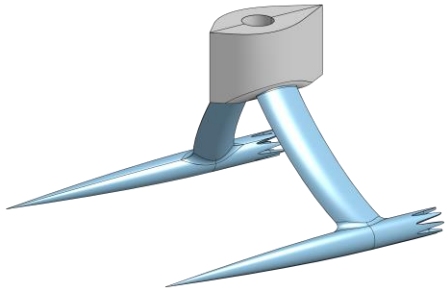

140 MPH
140 MPH
?

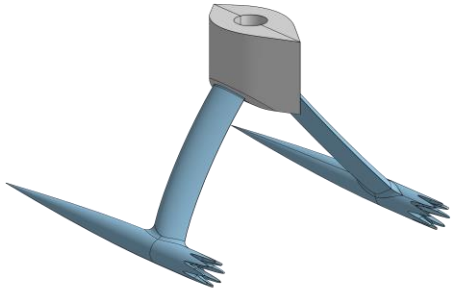

140 MPH
140 MPH
:(


140 MPH
40 MPH
140 MPH
100 MPH

Nozzle







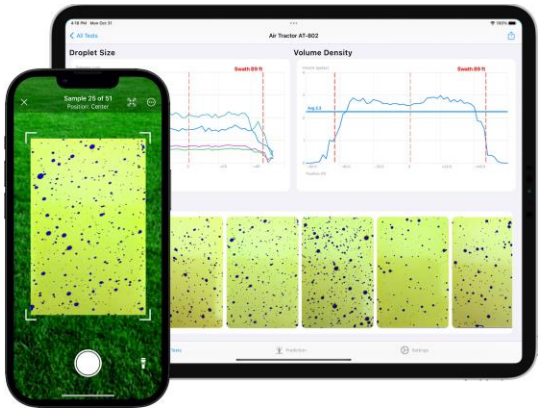

Straight Stream - 45 PSI

Experimental Nozzle - 400 PSI


Straight Stream - 45 PSI
Experimental Nozzle - 400 PSI

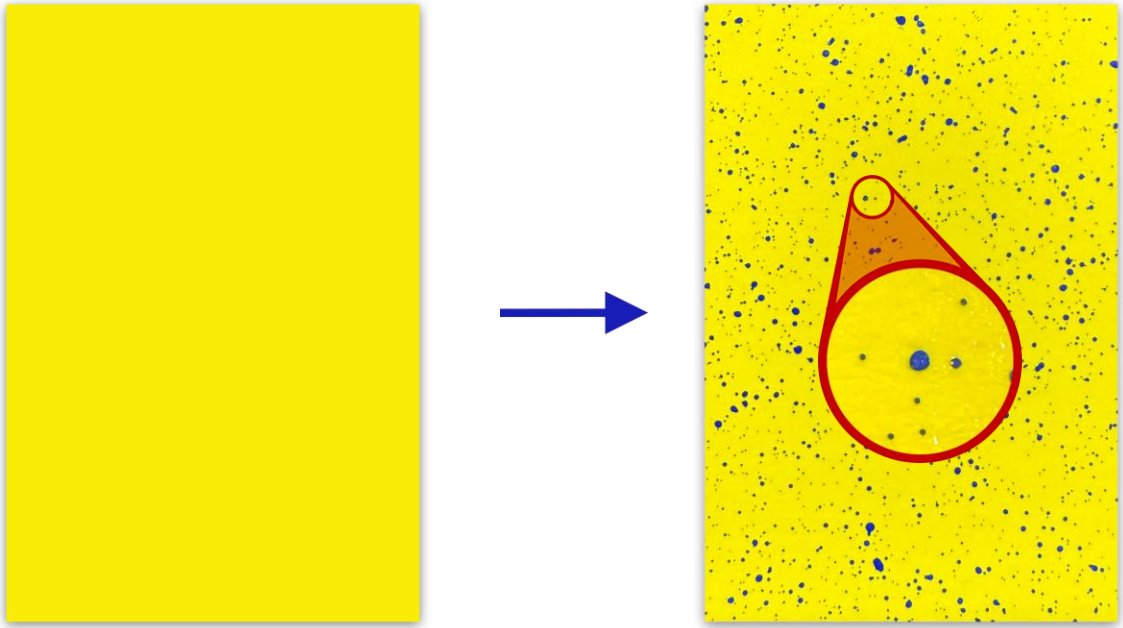
DropFlight

Droplet analysis tool



- Measures droplet size and pattern deposition
- Provides instant results
- Powerful
- Accurate
- Easy to use
- For operators and pilots

Water-Sensitive Paper



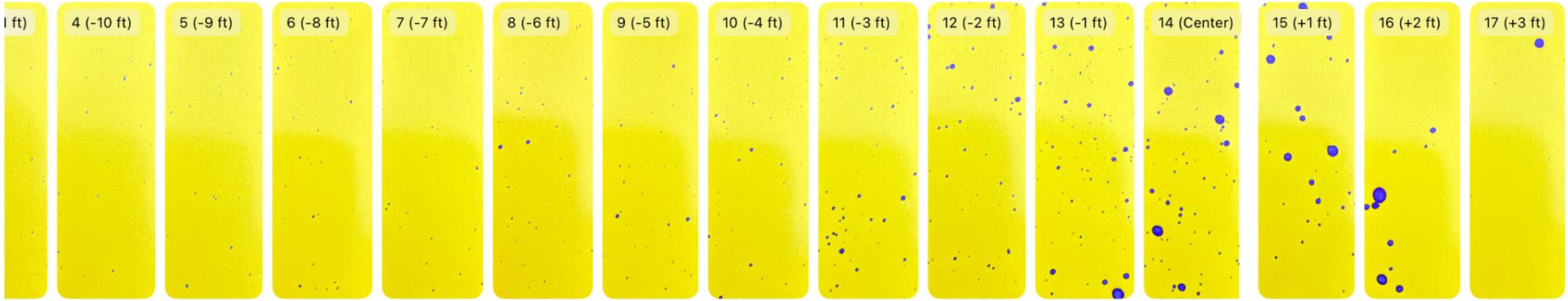
Testing Procedure

Analysis

Nozzle Results

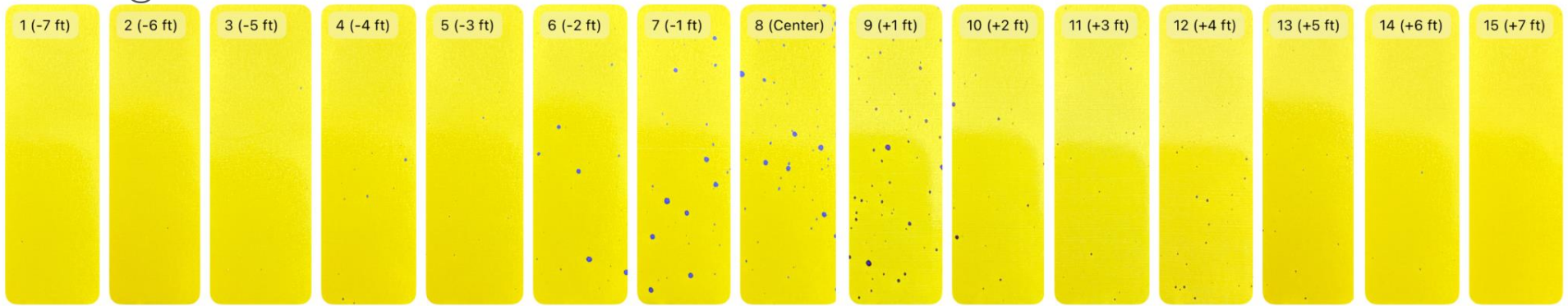
Straight Stream

.078” @ 45 PSI - 1 GPM

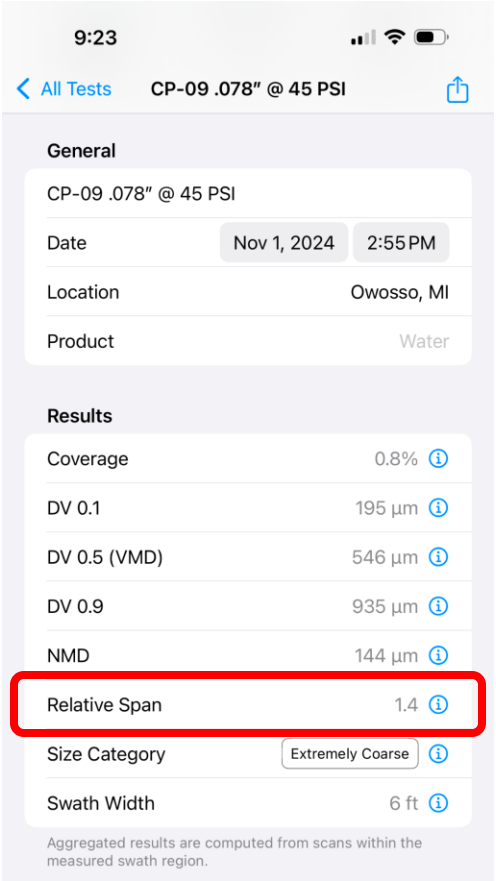


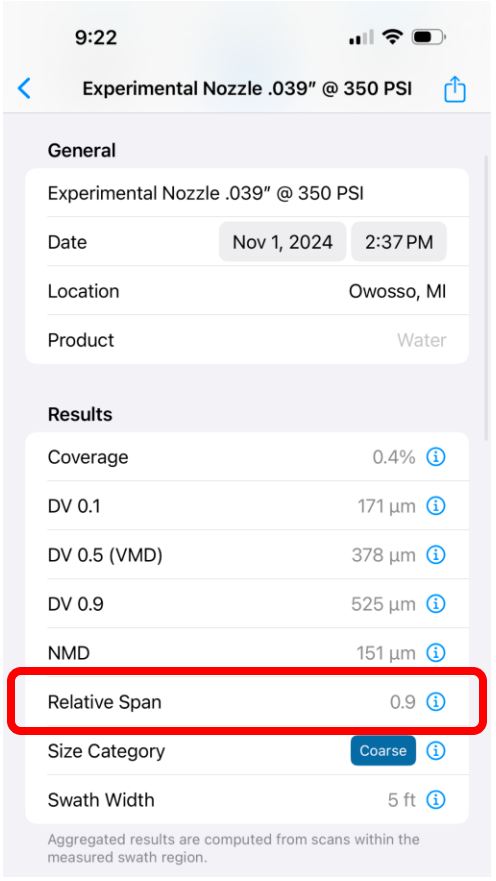
Experimental Nozzle

.039” @ 350 PSI - 1 GPM



Results


9:23
All Tests
CP-09 .078" @ 45 PSI
General
CP-09 .078" @ 45 PSI
Date
Nov 1, 2024
2:55 PM
Location
Owosso, MI
Product
Water
Results
Coverage
0.8%
DV 0.1
195 µm
DV 0.5 (VMD)
546 µm
DV 0.9
935 µm
NMD
144 µm
Relative Span
1.4
Size Category
Extremely Coarse
Swath Width
6 ft
Aggregated results are computed from scans within the measured swath region.


9:22
Experimental Nozzle .039" @ 350 PSI
General
Experimental Nozzle .039" @ 350 PSI
Date
Nov 1, 2024
2:37 PM
Location
Owosso, MI
Product
Water
Results
Coverage
0.4%
DV 0.1
171 µm
DV 0.5 (VMD)
378 µm
DV 0.9
525 µm
NMD
151 µm
Relative Span
0.9
Size Category
Coarse
Swath Width
5 ft
Aggregated results are computed from scans within the measured swath region.

Conclusion

- Pros
  - Improved relative span
  - Fewer fine droplets
- Cons
  - Smaller orifice, requires more tips to achieve desired flow rate
  - Potential for orifice obstructions
  - New spray system required to accommodate higher pressures
    - e.g. hydraulic / positive displacement pump

Next Steps

- Integration with a modified PWM boom
  - Use PWM to maintain flow rate, boom pressure to maintain nozzle exit velocity
- High pressure positive displacement pump to achieve needed pressures

DropFlight

www.DropFlightAg.com

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