



The Pesticide Stewardship Alliance 8th Annual Conference

Asheville, North Carolina

February 26, 2008

Andrew Moore, NAAA Executive Director

Presentation Outline

- NAAA & Aerial Application Industry Overview
- Stewardship Program Drift Mitigation Efforts
 - PAASS Program
 - Operation SAFE



- NAAA operator and pilot members are licensed as commercial applicators that use aircraft to enhance food, fiber and biofuel production, protect forestry, and control health-threatening pests.
- NAAA has 1,400 members in 46 states throughout the United States.
 - 1,100 NAAA Members are either operators or pilots of aerial application businesses.
 - Approximately 1,625 aerial application businesses in the U.S. and another 1,600 pilots.
- According to USDA's Ag Research Service, aerial application account for almost 25% of crop protection applications and nearly 100% of forest protection applications.

Aerial Application Industry Statistics & NAAA Goals

States with Greatest No. of Applicators*:

<u>State</u>	<u>Percent of U.S. Industry</u>
Arkansas	10.3
Texas	9.1
Louisiana	7
California	5.4
Kansas	5.4

Current NAAA records show no aerial applicators in Rhode Island and Vermont.

*From 2004 NAAA Survey



Aerial Application Industry Statistics & NAAA Goals*

No. of Aircraft per business:	2.2
Percent of industry airplanes:	88%
Percent of industry helicopter:	12%
Percent of aircraft closed-cockpit	97%
Percent of industry that use GPS	92%**

* From 2004 NAAA Survey

** An NAAA 1998 survey indicated that 60% of agricultural airplanes were equipped with GPS as compared to 25% in 1994.



Aerial Application Industry Overview

Why treat crops by air?

- Wet soil conditions
- Quickly treat large acreages (3 to 4 times as fast as other forms of application)
- Prevent soil compaction
- Prevents damage to crops by not disrupting foliage.

Aerial Application Industry Statistics & NAAA Goals

NAAA Environmental Goals

- Increase the application efficacy of crop protection products (use less; cover more);
- Deliver spray materials onto their intended target (mitigate drift);
- Address these goals through education and the development of new technologies

Education



NAAREF & PAASS



NAAA's sister organization - the National Agricultural Aviation Research and Education Foundation (NAAREF) - developed the Professional Aerial Applicators Support System (PAASS) - in 1998. PAASS is a comprehensive educational program for aerial applicators focusing on safety, security and drift mitigation.





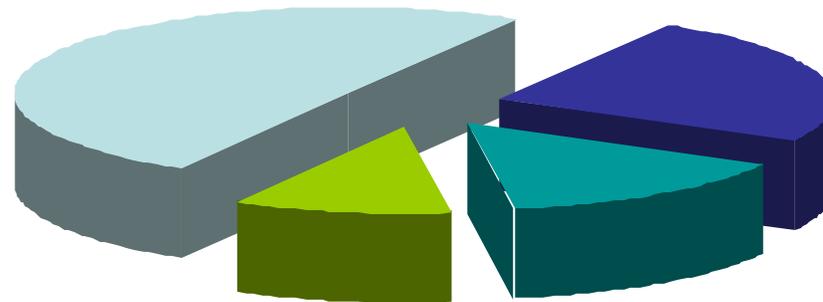
Professional Aerial Applicators Support System (PAASS)

- Offered at approximately 21 of the state and regional ag aviation association conventions each year.
- Many SLA's offer CEU's for PAASS attendance.
- PAASS has received funding from EPA and FAA.
- Many Insurance companies offer discounts and or additional coverage to pilots for attending PAASS.
- PAASS attended by approximately 1,800 ag pilots and aerial application operators each year.
- PAASS goals: reduce the number of aviation accidents and drift incidents associated with aerial application and enhance security through education.

Source of NAAREF Funds for PAASS Development

Attendance

Fees
50%



**Allied
Donations**
24%

Gov't Grants
11%

**Operator
Donations**
15%

- Allied Donations are from Insurance Companies, Aircraft and Equipment Manufacturers, Chemical Companies, Aircraft Service Companies
- Operator Donations are given to the PAASS program by Operators & Pilots
- Government Grants are from the EPA and the FAA
- Attendance Fees are the charges made for attending the PAASS program



Program Development & Presentation



- Educational content designed by distinguished program content committee (University PhD's, crop protection product manufacturers, insurance company reps, aircraft & spray equipment engineers).
- Presented by experienced pilots, operators and other allied industry personnel professionally trained that speak the audience's language.
- At each session the participants of PAASS are requested to evaluate the program and presenters.
- This immediate feedback allows program to be constantly strengthened and remain pertinent to current industry environment.

Examples of PAASS Modules

- *Spray Drift Reduction – “Spray System Maintenance to Avoid Misapplications”*
- *Spray Drift Reduction – “Speaking & Understanding Label Language”*
- *Spray Drift Reduction – “On Target Delivery Tools”*
- *Operational Security*
- *Human Factors in Agricultural Aviation – Telly Award Winner 2003*

Drift Mitigation Examples in PAASS Program

- PAASS Program teaches applicators how to:
 - Use droplet spectrum software models for drift mitigation
 - Conduct spray system maintenance to avoid misapplications

Drift Mitigation Examples in PAASS Program

- Spray drift reduction software models
 -   Nozzle Atomization Model
 - Spray Drift Task Force (SDTF) AgDrift® spray model
 - Models allow user to input and select specific operational parameters such as aircraft, nozzle type and nozzle size, wind velocity, airspeed, and pressure.
 - Output: model results will then be related quantitatively to spray drift and various drift mitigation options (i.e. droplet size, and amount of product moving off-target.)

USDA Aerial Nozzle Atomization Models

CP-03 NOZZLE

FOR USE ON FIXED-WING AIRCRAFT

AERIAL APPLICATORS SPRAY NOZZLE HANDBOOK

USDA ARS AGRICULTURAL HANDBOOK NO. XXX

I. W. Kirk, Agricultural Engineer, Areawide Pest Management Research Unit,

Southern Plains Agricultural Research Center, Agricultural Research Service, U. S. Department of Agriculture, 2771F&B Road, College Station, TX 77845-4966, USA.

Directions: Enter CP-03 nozzle settings, pressure, and airspeed in the cells highlighted below.
(Atomization parameters are valid only with nozzle and operational settings specified in the Acceptable Range.)

	Orifice Size, inches	Deflector Angle, degrees	Pressure, psi	Airspeed, mph
Acceptable Range:	.061 to .171	30 to 90	20 to 60	100 to 160
	0.125	30	60	130

Atomization parameters are displayed in the box below.

CAUTION: Do not enter or clear data in the cells in this box!

$D_{V0.5} = 301 \mu\text{m}$	= Volume median diameter
RS = 1.01	= Relative Span
%V<100 μm = 6.62 %	= Percentage of spray volume in droplets smaller than 100 μm diameter.
%V<200 μm = 17.51 %	= Percentage of spray volume in droplets smaller than 200 μm diameter.
DSC = MEDIUM	= ASAE S572 AUG99 Droplet Spectra Classification

Values and classifications reported here are least-squares best-estimate predictions from experimental data collected in a wind tunnel.

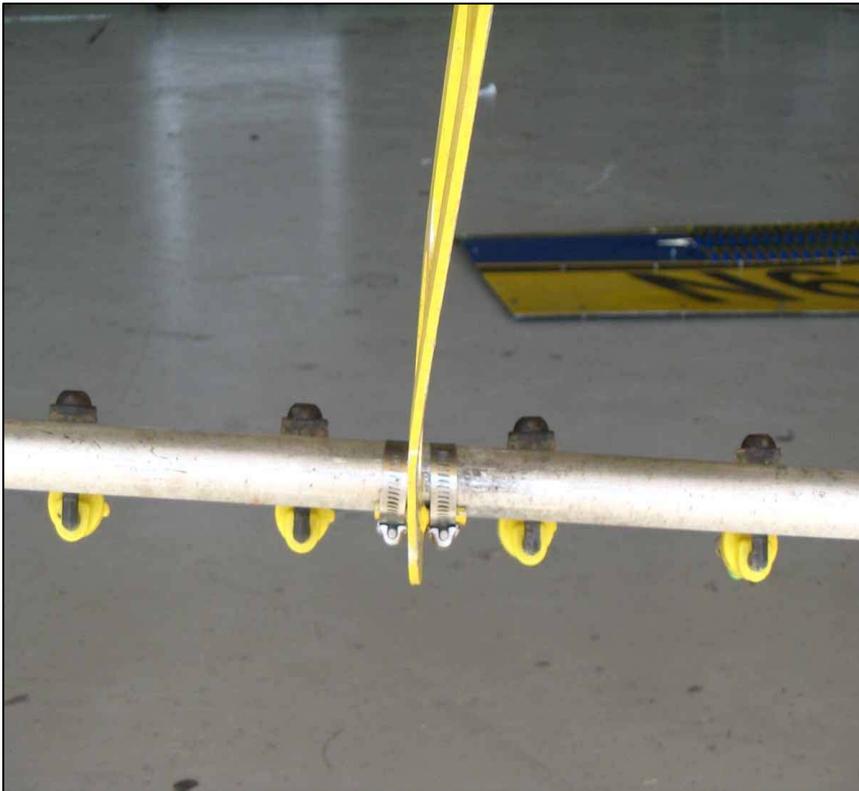
Values reported from other laboratories may not yield the exact same values, but similar trends would be expected.

The ASAE droplet spectra classification category is based on droplet sizes in the mid-80% of the spectrum and not a single data point.

Trade names are mentioned solely for the purpose of providing specific information. Mention of a trade name does not constitute a guarantee or warranty of the product by the U. S. Department of Agriculture, and does not imply endorsement of the product over other products not mentioned.

Drift Mitigation Examples in PAASS Program

The PAASS Program educates applicators about conducting proper maintenance of their spray systems.





Education: NAAREF & Operation S.A.F.E



Operation S.A.F.E. Fly-Ins provide spay pattern testing clinics allowing the ag pilot the opportunity to work with a trained analyst to test and calibrate his ag aircraft application equipment.

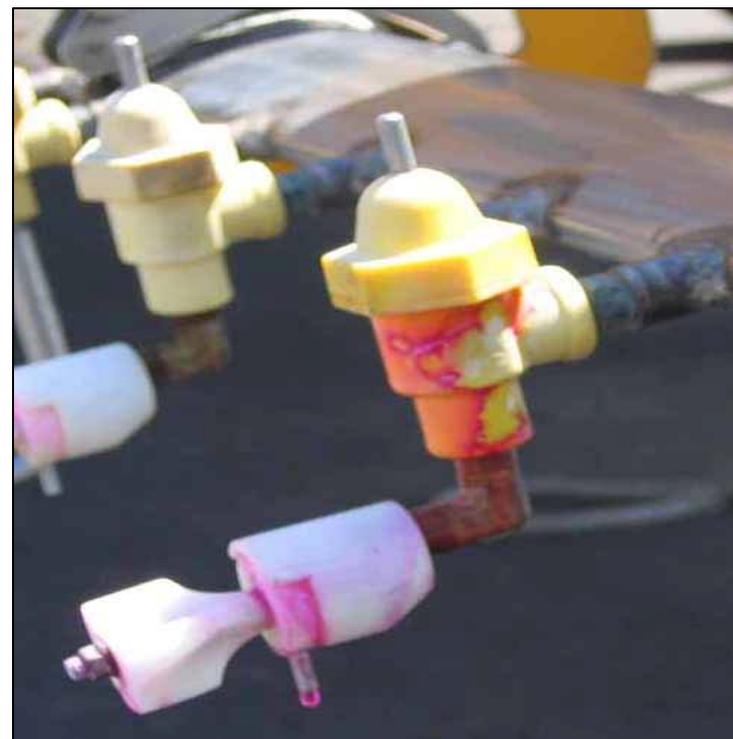




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NAAREF & Operation S.A.F.E



2007 Statistics

Number of Total S.A.F.E. Clinics: →→ 35

Number of Total Participating Aircraft:→ 253

Number of Total Passes Analyzed: →→ 1,704

NAAA Efforts to Enhance Aerial Technology

- ARS Efforts
 - Sought and Obtained Increased funding for ARS Aerial Application Research Technology Program by \$4 million over 7 years.
 - Facility tests and design many of the new technologies coming to market
 - Variable Rate
 - Using GIS and flow control to use crop protection products only where needed at the exact rated needed
 - Using meteorological technology to provide real time nozzle adjustments and flow of chemical to mitigate drift
- Use PAASS Programs, Operation S.A.F.E. clinics, magazine and annual convention to keep industry abreast of new technologies



NAAA Efforts to Enhance Aerial Technology



Aircraft - Integrated Meteorological Measurement System (AIMMS) measures site specific atmospheric turbulence data to support aerial application, including wind speed, direction, altitude, humidity and temperature.

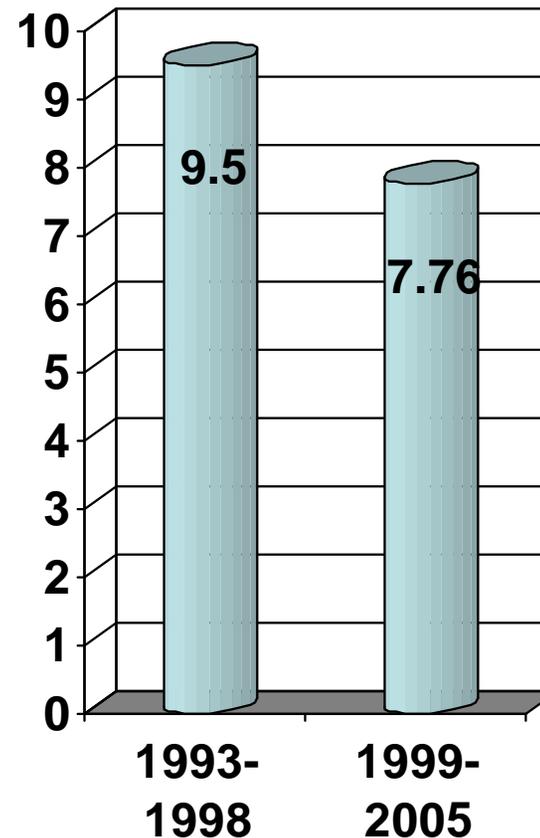
NAAA Efforts to Enhance Aerial Technology



Electrostatic Nozzles— developed by ARS—induces the chemical droplets with either a positive or negative charge before their release over the target. Charged aerial sprays are attracted to targeted objects such as crops, trees and other plants. Electrostatic nozzles can be very beneficial in the aerial application industry because you can use less carrier per acre with the active ingredient; hence you can apply more acres per load. This means less fuel used.

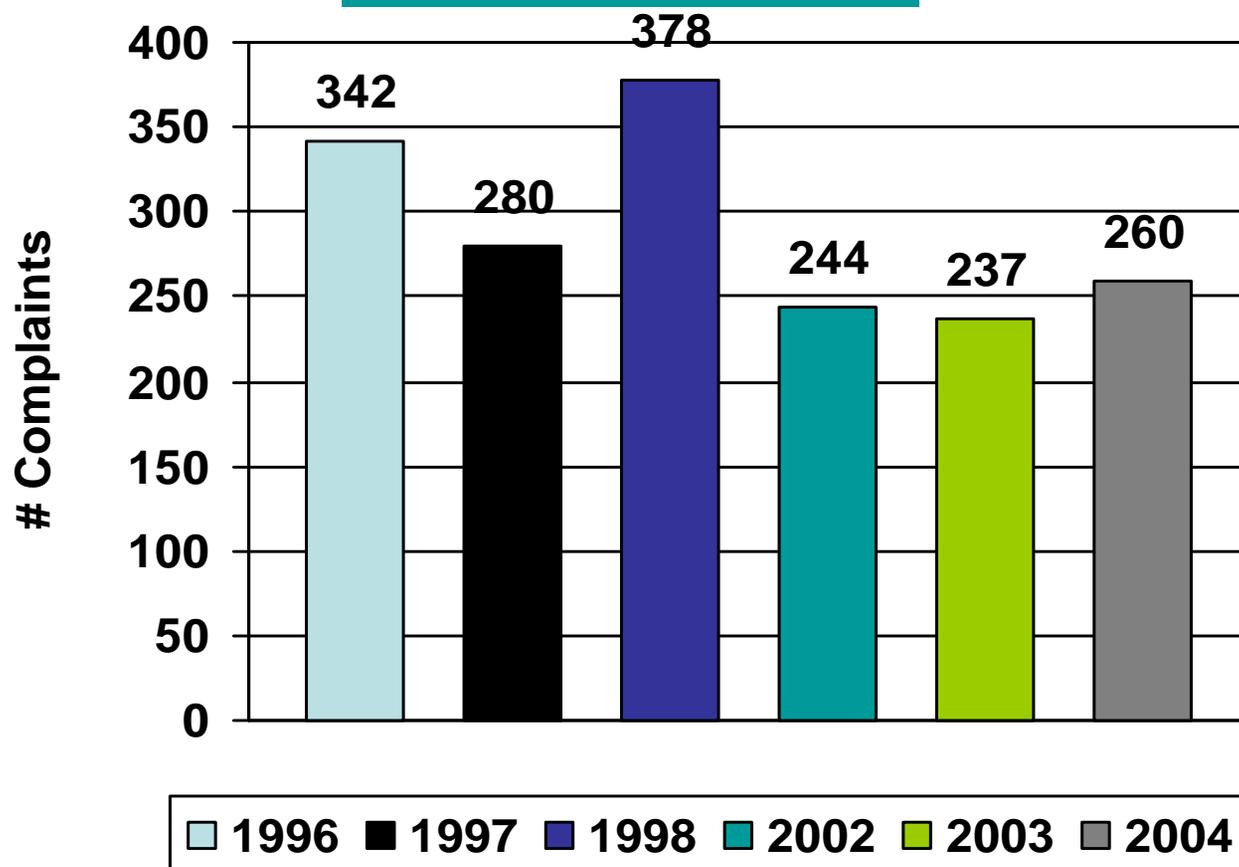
Ag Aircraft Accident Rates Before & After PAASS Began

- Agricultural Aircraft accidents are down.
- Avg. accident rate pre-PAASS (1993-1998) - 9.5 accidents per 100,000 ag hours flown
- Avg. accident rate after PAASS began (1999-2005) - 7.76 accidents per 100,000 ag hours flown



■ Accidents per 100,000 hours

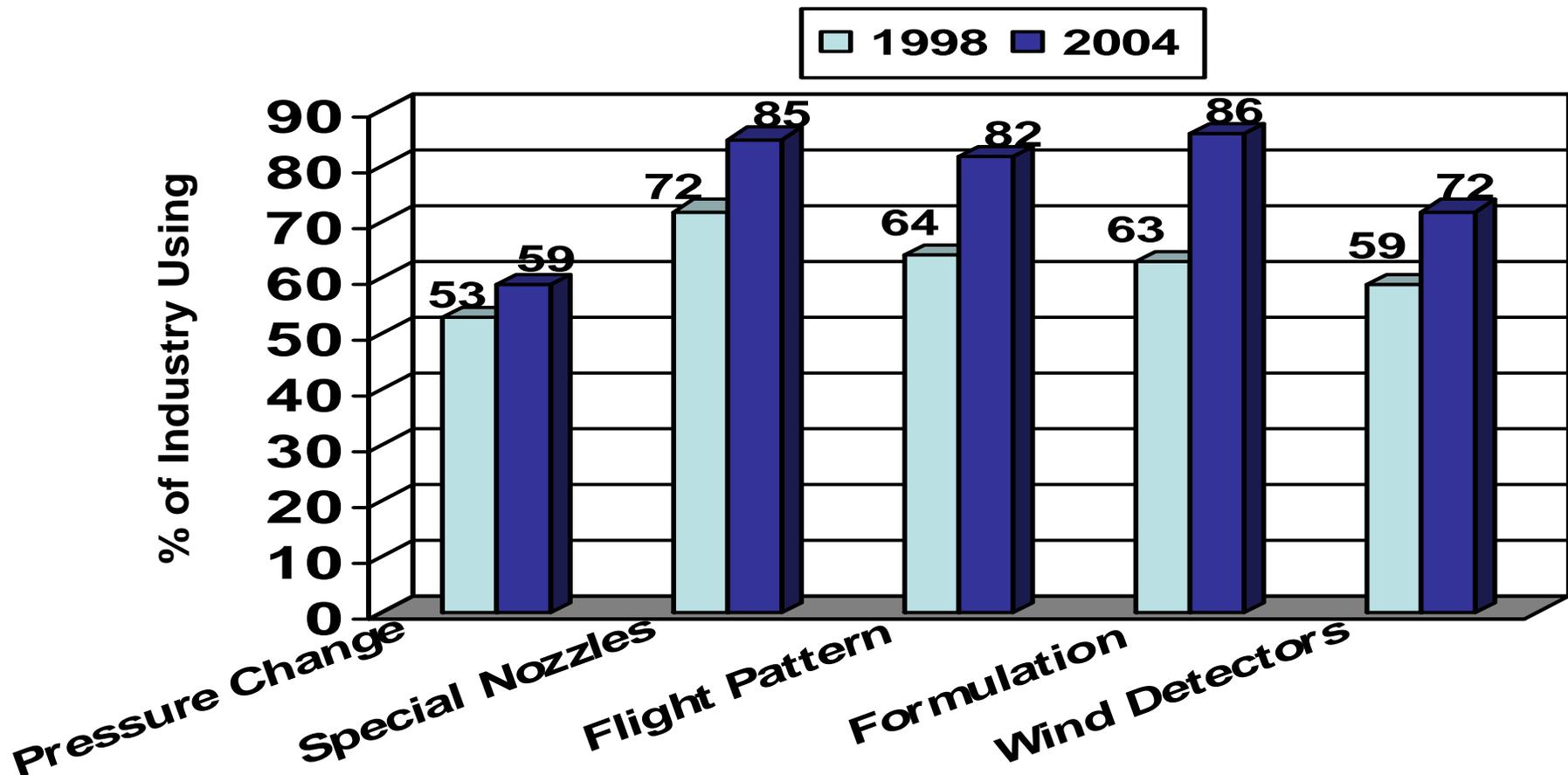
AAPCO Confirmed Aerial Drift Complaints



- This is out of an estimated 200 - 250 million acres treated by air per year
- Drop in drift complaints by 26% when comparing 3 year periods

Drift Mitigation Advancements

The PAASS program has influenced Aerial Applicators to increase their adoption of drift reduction techniques and technologies.



Conclusion

- Through PAASS & Operation S.A.F.E. education the professionalism of the aerial application industry is augmented and environment protected.
- Technological developments through USDA and private research enable equipment and educational content material for aerial applications to be more environmentally friendly, precise and efficacious.





Thank You to The Pesticide Stewardship Alliance!

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