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Aircraft




A lot of fun!



AgWork 2002





All applications must be made uniformly over the entire crop

- Make sure the aircraft is utilizing the optimum swath width.
- Avoid misses around obstructions.
- Dress headlands to get those areas around trees and power lines.
- Do not plant areas that cannot be effectively treated by aircraft. Work with your applicator to determine where these areas are – plow them up if necessary to avoid hot spots.



Utilize the optimum application height.

- Most turbine aircraft need to be operated with the spray boom 10-12 feet above the crop canopy – and the very large (660 to 800 gallon capacity) aircraft even higher.
- Both, lower and higher, release heights may reduce pattern uniformity and increase drift potential.



Tips

- Don't spray during the heat of the day if possible. As the more and more energy is absorbed into the canopy, it becomes more difficult to pass the smaller droplets through the strong micro-inversion layer that forms at the top of the crop.
- Utilize nozzles that control droplet spectrums well. Choose nozzles that make as few droplets as possible below 200 μ (microns).
- Years of work in heavy canopies indicate the droplet spectrums should be targeted in the 285-335 VMD (volumetric median diameter – where $\frac{1}{2}$ of the spray volume is that size or larger and $\frac{1}{2}$ of the spray volume is that size or smaller) range.



Droplet data

- Droplet spectrum may be the most important aspect of these applications and should be carefully adjusted with nozzle selection, operating pressure, and mounting configuration.
- Small changes in droplet diameter make big changes in droplet volume! (Example: It takes (1.6) 300 μ droplets to equal (1) 350 μ droplet and (2.4) 300 μ droplets to equal (1) 400 μ .)
- There are excellent aerial models available to help determine the expected droplet spectrum.

<http://apmru.usda.gov/downloads/downloads.htm>



Aircraft speed v. droplet spectrum.

- The optimum droplet spectrum can generally be developed by selecting the appropriate setup configuration.
- Turbine powered, faster aircraft, generally have more uniform patterns.
- It may be more difficult for faster aircraft to work around some obstructions.



Tips

- Total spray volume per acre will be somewhat dependent on crop canopy structure. Three GPA is suggested as a minimum an optimum being in the 5-7 GPA range. There is generally a lot of disagreement on this issue, with a lot of opinions leaning toward more water. Canopy penetration and deposition studies just haven't indicated a strong need for more diluent volume.
- The use of adjuvants and surfactants may be very beneficial as spreaders and stickers. Care should be taken to avoid major droplet spectrum changes when these products are being utilized.
- If multiple applications are made, utilize different travel lanes or go in the opposite direction to move droplets into the canopy at different angles.



Weather

- Winds are an aid to canopy penetration
- Avoid spraying under calm conditions
- Direct sunlight will quickly build a strong inversion over dense canopies
- Early in the day may be best

Air Temp 85F

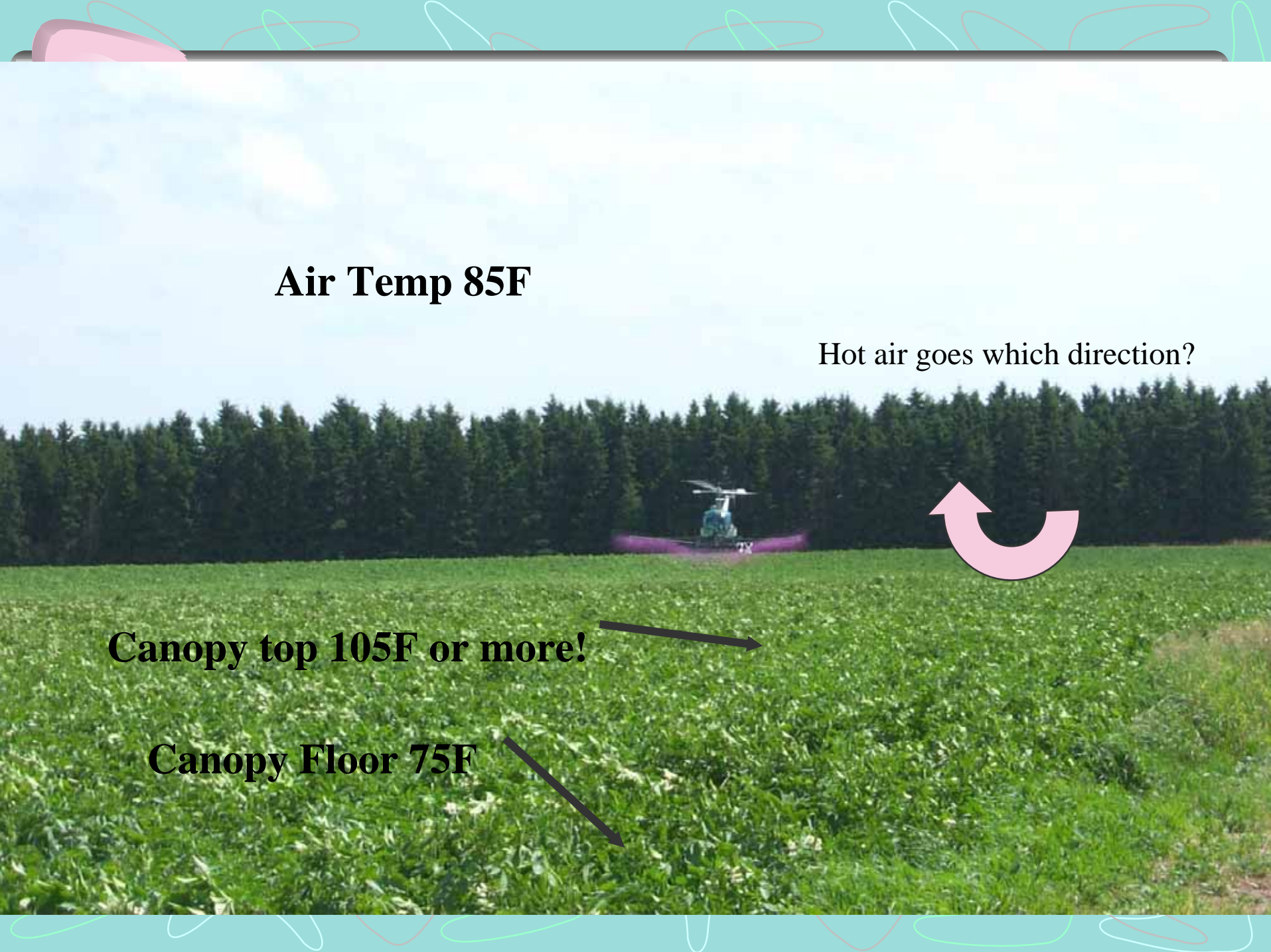
Hot air goes which direction?



Canopy top 105F or more!



Canopy Floor 75F





Size

- $290/250 = 1.16$
- 290 micron droplet is 16% larger than 250
- This may not appear to be a big change, but???



Droplet Data

- 250 v. 290 micron droplet
- Change in size?
- Change in Volume or Weight?



Volume or Weight

- Remember that this is a cube root relationship.
- If it was twice as big we would multiply
- $2 * 2 * 2 = 8$ times heavier
- For $290/250 = 1.16$
- $1.16 * 1.16 * 1.16 = 1.56$
- Implies that a 290 micron droplet is 56% heavier than a 250!

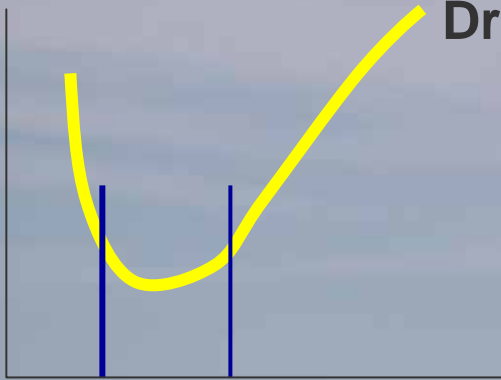


How much does it matter?

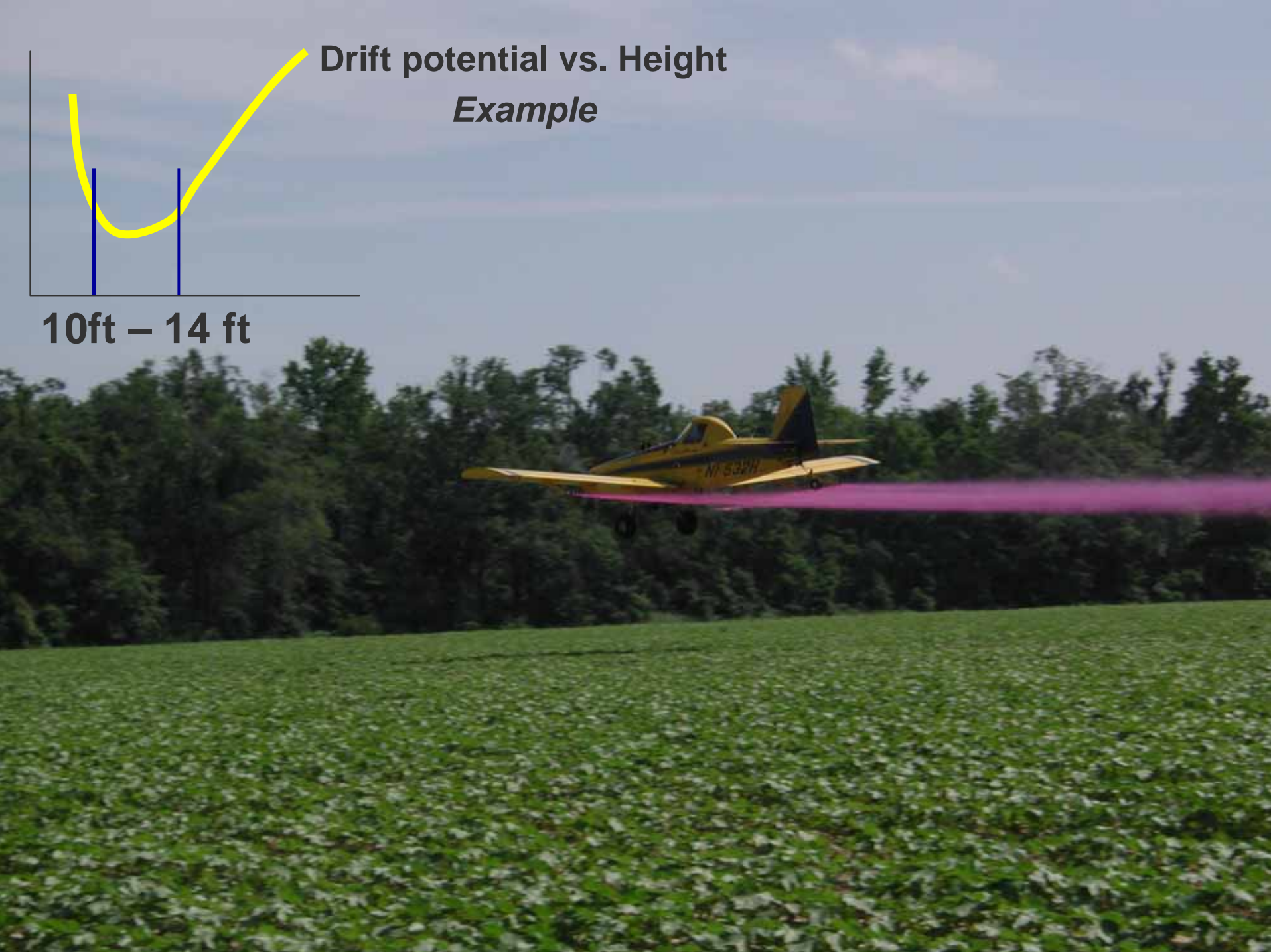
- 310 v. 350 micron ?
- $350/310 = 1.13$
- $1.13^3 = 1.44$
- 44% increase in volume or weight!!!!
- 285 v. 350 (23% dia – 85% weight)

Drift potential vs. Height

Example



10ft - 14 ft



Operation S.A.F.E.

- Verify Your Aircraft Set Up
- Attend an Operation S.A.F.E. Fly-In





Other areas

- Electrostatics
- Low and slow v. optimum and normal
- Smaller droplets are better?



Summary of findings:

- Top of canopy had highest coverage.
- Canopy reduced coverage by 3 times.
- 3 GPA had more canopy coverage than 1 GPA.
- Droplet spectra slightly influenced - larger.
- Deposition aids increased canopy penetration.
- Product differences were measured.
- Highest coverage - Interlock and Preference.



AR Soybean Deposition Summary

- Full canopy 2, 3, 5 GPA - Aerial
- More volume/coverage with higher rate but not more ai.
- Droplet size is very important! ~285-295 most efficient
- Better canopy penetration with some wind 3-7 mph
- Always better coverage in the top on the canopy
- Dense canopies are difficult to penetrate – especially in calm conditions with direct sunlight

Questions?

Thank you.

