Double Flat Fan Venturi Nozzles from agrotop
Optimising coverage using double flat fan venturi nozzles
Orientation of spray pattern for standard flat fan and double flat fan nozzles

- 90° to backward
- 30° to forward
- 30°
Technical differences of a TurboDrop double flat fan venturi nozzles

- 30° forward and backward angel
- Hits target from the front and from the back
- Finer droplets compared to a single venturi nozzle, but larger than standard double flat fan
- Drift reduction trough venturi technology
Comparison of different application technologies for fungicide applications in winter wheat (yield in t/ha).

AirMix® venturi nozzle as a single nozzle compared to 2x AirMix® in a double flat fan cap (DF) creating two angled sprays (forward und backward), at two different application rates.

Source: Bayerische Landesanstalt für Landwirtschaft 2005.
Effect of TDDF on coverage

<table>
<thead>
<tr>
<th>Standard Nozzle 110-05</th>
<th>TurboDrop® DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 l/ha; 6,5 km/h; 2,0 bar;</td>
<td>550 l/ha; 5 km/h; 6 bar;</td>
</tr>
<tr>
<td>VMD 330µm</td>
<td>VMD 420µm</td>
</tr>
</tbody>
</table>

Vertical front

Vertical back

Horizontal

Data measured at the DEULA workshop “Current Spray Technologies” in 2001, Freising Germany
Advantages of TurboDrop® and AirMix®
Double Flat Fan Venturi Nozzles (DF)

Better coverage and **improved** efficacy for:

- Fusarium treatments of ears (**contact**)
- Potatoes (**between leafs specially when crop density is lower**)
- Vegetable (**anions, leek, etc.**)
- Post emergence in sugar beet
  (**weeds “covered” by sugar beet leafs**)
- Grass weeds in early development stage
  (**e.g.** black grass)
- Ornamental plants

Less penetration in very dense crops compared to a TurboDrop standard flat fan
TurboDrop® HiSpeed

The latest advance in nozzle technology
Why do farmers require higher application speed?

- Farm sizes increase every year
  Need of efficient applications on large areas

- Optimising application techniques
  To achieve best chemical performance, application must be done at recommended developing stage of the crop.
  A shorter “time window” requires an increase in the application strength
Successfully applications are guaranteed through:

• effectual coverage
• uniform distribution of spray on crop and target areas respectively
• adequate penetration, if required
Using flat fan nozzles at higher application speeds reduces the:

- crop penetration of the spray
- uniformity of the coverage
Trajectory of droplets of flat fan nozzles

spray direction
Ø 2,5 m/s (1,9-4,1 m/s)
high variability within the spray pattern

application speed
2,5 m/s = 9 km/h

trajectory of droplets

“shadow” areas

+ psi
+ km/h

driving direction
Crop penetration spraying with flat fan nozzles

- Low application speed: small impact angle, better penetration
- High application speed: wide impact angle, less penetration
Droplet trajectory of double flat fan nozzles

Improved coverage of “shadow” areas at lower application speed

Droplet trajectory

Driving direction

\(2,0 \text{ m/s} = 7,2 \text{ km/h}\)

\(\phi 2,5 \text{ m/s}\)
Droplet trajectory at TurboDrop® HiSpeed

- Ø 2.5 m/s
- 3.3 m/s = 12 km/h
- 10°
- 50°
- droplet trajectory
- optimum coverage of “shadow” areas, even at higher application speeds

driving direction
Problems with the uniformity of the coverage at higher application speeds:

• may be resolved partially using double flat fan nozzles with symmetric alignment of the spray patterns, at lower application speed (approx. 7-8 km/h)

• better results can be obtained using double flat fan nozzles with asymmetric alignment of the spray patterns, like the TurboDrop® HiSpeed, specially at higher speeds (approx. 16 km/h)
This theory has been validated through:

• the knowledge of using double flat fan nozzles in the field since 1995

• field trial of the “Bayrischen Landesanstalt für Landwirtschaft” from 2003-2005

• a master thesis at the agricultural colleague FH Weihenstephan

• the comparison of the coverage of different nozzle types, spraying under field conditions

• the enthusiastic feedback of users in 2007

TurboDrop® DF 1995
AirMix® DF 2001
 TurboDrop® DF 2005 (USA)
wide droplet spectra
TurboDrop® HiSpeed 2007
Testing coverage using a standardised support for water sensitive paper
Coverage of flat fan nozzles at different application speeds

7 km/h

16 km/h
Coverage of flat fan nozzles and und TurboDrop® HiSpeed
Testimonials using TurboDrop® HiSpeed

Cereals 3000 ha
HiSpeed 110-02
100-150 l/ha; 9 km/h; 4-6 bar
“Relatively fine spray (drift), perfect in all other respects.”

Ear treatment 1200 ha
HiSpeed 110-03
140 l/ha; 16 km/h; 5 bar
“High working rate due to lower application volume, good coverage.”

Sugar bete 200 ha
HiSpeed 110-02
150 l/ha; 8 km/h; 4,5 bar
“Extremely clean field.”
Conclusion:
Good coverage and efficacy of an application can be achieved, even at higher application speeds, using the appropriate nozzle technology.

TurboDrop® HiSpeed
Thank you for your attention!

Your agrotop Team

Wherever you need us

http://www.agrotop.com

agrotop GmbH    Köferinger Strasse 5    D-93083 Obertraubling