

Aerial Application of Fungicide on Barley

V. Hofman and S. Halley, North Dakota State University, Fargo. ND



Scab on Barley Heads

Abstract

Fusarium head blight (FHB) has been a major problem for cereal grain producers during the past decade. To combat this disease, growers have applied fungicide by both aerial and ground application. About 50% of the small grains acreage sprayed with fungicide in the Dakota-Minnesota region of the Great Plains is applied with spray planes. An aerial application study was conducted near Esmond to evaluate fungicide application for control of FHB on 'Drummond' barley. The study was designed as a randomized complete block with three replicates. The treatments included the fungicide Folicur (tebuconazole) applied with spray of 3 or 7 GPA applied with a fine and a medium size drop and a volume of 5 GPA applied with a medium size drop. The applications were made to heading barley (greater than 50% of main stem heads fully extended from the boot). The fungicide was applied with Induce adjuvant at 0.125% v/v and F D&C Blue #1 dye at 22 grams per acre. The dye is a food grade type. A common method to evaluate spray technology is the use of water and oil sensitive paper. Water sensitive cards, were placed at grain head height on stands. One card was placed horizontal. Other cards were placed vertical, back to back and oriented forward and backward and right and left on stands within the sprayed plots. Stain size was determined with WRK Droplet Scan system. Three 50 ft spray passes were made side by side (150 ft) on each plot. All data was collected from the center of the plot. Additionally, 5 heads were collected at 5 points across the swath width and placed in Erlenmeyer flasks for determination of head coverage by washing the food dye with a 80% alcohol solution and recording absorbance with a spectrophotometer. Field counts were determined by a visual assessment of FHB and foliar disease at mid dough growth stage by assessing twenty heads in two locations per plot and determining the incidence of the disease and the severity of the individual head. The incidence x the severity of the 20 heads gave a field severity per plot. Foliar disease differences were determined by estimating the infected area on 5 leaves at two locations. Data were analyzed with the general linear model (GLM) in SAS. Least significant differences (LSD) were used to compare means at the 5% probability level. Differences in all measurement parameters were not significant due to almost 100% incidence in both the treated and untreated plots and high field severity. No differences in yield, test weight, plump, protein and DON were found. Drop size differences were also found to be insignificant due to large variations in coverage and drops deposited on the water sensitive cards were likely due to orientation of the plots and the variable wind speed recorded during spray application. Coverage on the head, although not significantly different trended to greater amounts with smaller spray volumes. This is due to the exceptional efficiency of small drops depositing on small collectors (awns).

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Table 1. Fusarium Head Blight Incidence and Field Severity, Leaf Disease, Yield, Test Weight, Plump, DON, Protein, and Dilution by Spray Volume and Drop Size, Barley Field near Esmond, ND 2005.

Spray Volume GPA	Drop Size	FHB Incidence %	Field Severity %	Leaf Disease %	Yield		Plump %	DON PPM	Protein %	Dilution
					Bu/A	Lb/Bu				
Untreated	NA	99	17.7	13.3	72.0	47.9	85	6.3	12.0	NA
3	Fine	98	16.3	8.3	74.2	47.3	85	10.0	12.2	3.126 x 10 ⁴
3	Medium	100	14.1	10.7	77.8	48.0	86	6.3	11.9	3.020 x 10 ⁴
5	Medium	99	15.5	12.7	77.9	48.3	87	7.3	12.1	3.031 x 10 ⁴
7.5	Fine	98	15.4	8.6	77.5	47.8	87	6.7	12.1	2.790 x 10 ⁴
7.5	Medium	100	15.2	5.2	75.6	47.9	88	8.2	12.0	2.887 x 10 ⁴
LSD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
% C.V.	2.0	11	76	4	1	2	34	2	7	



Cessna Ag Truck Spray Plane

Table 2. Volume Median Drop (VMD) Size on Horizontal, Front, Back, Left and Right Placed Cards and 0.1 VD Spray Volume Drop Size on Horizontal, Front, Back, Left, and Right Collected on Water Sensitive Cards, Barley Field near Esmond, ND 2005.

Spray Volume GPA	Drop Size	VMD				0.1 VD					
		Hori.	Front	Back	Left	Right	Hori.	Front	Back	Left	Right
Untreated	NA	326	438	465	324	509	254	97	98	62	320
3	Fine	294	430	224	428	297	163	191	113	248	150
3	Medium	371	354	336	339	271	215	196	142	186	161
5	Medium	354	210	376	352	290	195	118	146	169	143
7.5	Fine	389	307	355	408	355	208	180	174	186	183
7.5	Medium	353	343	314	343	391	202	125	140	181	177
LSD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
% C.V.	8	46	26	37	31	20	38	38	42	84	

Table 3. Spray Volume Drop (0.9 VD) Sizes collected on Horizontal, Front, Back, Left, and Right and Percent Spray Coverage on Horizontal, Front, Back, and Combined Left/Right on Water Sensitive Cards, Barley Field near Esmond, ND 2005.

Spray Volume GPA	Drop Size	0.9 VD				% Coverage				
		Hori.	Front	Back	Left	Right	Hori.	Front	Back	Left/Right
Untreated	NA	449	658	647	529	739	0.3	1.0	1.7	1.4
3	Fine	422	612	409	528	460	3.7	0.6	12.3	3.3
3	Medium	550	563	453	549	433	6.8	0.6	8.5	3.0
5	Medium	541	314	580	586	422	9.0	0.3	14.9	7.4
7.5	Fine	624	502	611	643	574	13.4	0.1	34.0	11.0
7.5	Medium	503	563	529	534	685	6.1	0.1	17.1	7.6
LSD	NS	NS	NS	NS	NS	192	6.9*	NS	NS	4.8
% C.V.	24	20	20	30	19	58	76	78	78	47



Harvesting and Measuring Crop Yield

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North Dakota State University, Fargo, ND
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Examples of Water Sensitive Cards



Field Card Holders

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