

## *ENTAM - Test Report*



**Sprayer type:**  
**Trade mark:**  
**Model:**

**Self propelled turf sprayer**  
**John Deere**  
**HD 200 (European Version)**

**Manufacturer:**  
John Deere Turf Care  
6501 Highway 55 East  
Fuquay-Varina, NC 27625  
USA

**Test report: D - 2123**

March 2018

<b>Assessment table</b>
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No.	Contents	Assessment
1	Spray tank surface roughness	+++
2	Spray tank over volume	+++
3	Volume of total residual (here max. allowed 14.5 l)	+
4	Spray tank contents gauge up to 20% Filling	+++
5	Spray tank contents gauge from 20% Filling	++
6	Agitation system	++
7	Width of nozzle bar section	+++
8	Boom height adjustment range	non
9	Accuracy of pressure gauge	++
10	Accuracy of flow meter	see no. 14
11	Regulation speed (s)	++
12	Even transverse distribution	+++
13	Rinsing water tank	+
14	Deviation of volume/hectare adjustment device (spray computer) from desired value	+++
15	Repeatability of volume/hectare adjustment device (spray computer) *	++
16	Pressure drop between manometer and nozzle	++
17	Deviation of single nozzle output from table	++

Tab.1+2: Assessment table and assessment keys of important test results.

\*) changed requirement

No.	unit	+	++	+++	No.	unit	+	++	+++
1	µm	>70-100	30-70	<30	10	%	4-5	2-4	0-<2
2	%	5-8	>8-12	>12	11	% or s	>7-7.5	>3-7	0-3
3	of allowed value	>2/3-3/3	1/3-2/3	<1/3	12	CV	>7-9	4-7	<4
4	%	7.5-5.0	<5.0-2.5	<2.5	13	% of spray tank	10-12	>12-14	>14
5	%	5.0-4.0	<4.0-2.0	<2.0	14	s	>4-7	2-4	<2
6	%	>10-15	5-10	<5	15	deviation %	>4-6	2-4	<2
7	m	4.5-6	>3-4.5	3 or less	16	%	>7-10	3-7	<3
8	m	1-1.5	>1.5-2.0	>2.0	17	%	>7-10	3-7	<3
9	bar	>0.10-0.20	>0.05-0.10	0.00-0.05					

Free download of the test under: [www.ENTAM.net](http://www.ENTAM.net)  
or [www.julius-kuehn.de](http://www.julius-kuehn.de)

## Technical data of sprayer

- 700 l tank.
- Electronic contents indicator.
- John Deere Spraycomputer 4640 Universal.
- 15.8 l hand wash tank.

- 71 l rinsing water tank.



Fig.1: Overview.

- 5.5 m working width.
- 3 hydraulic sections, max. 2 m section width.
- Fixed at 500mm working height.

- Pentair Centrifugal pump 93 HPS with 131 l/min at 4 bar and 75 l/min at 7 bar.

### Dimensions and weights :

total length:	2500 mm
height:	2230 mm
width:	2330 mm
unloaded weight:	320 kg
total weight:	1080 kg



## Description of sprayer



Fig.2: Left sprayer side, with new designed tank contents indicator and receiver of the GPS positioning system „StarFire 6000“ on the roof (optional, not tested).

The John Deere HD 200 is a spraying unit mounted on a ProGator 2030A carrier vehicle. It is designed for spraying of turf grounds like golf courses and is not equipped for road use. The tested carrier is motorized by a 17.8 KW Diesel engine from Yanmar (Tier 4 emission class) with rear wheel drive and 5 speed gearbox and differential lock. According manufacturer's data the carrier is also available as 4 WD version.

The complete spraying unit with tank, pump and boom can be put down from the carrier, then it rests on support legs in the front and at the centre part of the boom. The spray tank contains up to 700 l spray liquid (over volume 16.5 %). The tank is made from polyethylene and is without wash plates. For mixing of the spray liquid the tank is equipped with a pressure agitation system which consists of a central pipe with 8 injection nozzles and two pipes with additional 4 injection nozzles



Fig.3: Tube (ball) tank contents indicator, with scales to the front and to the rear.



## Description of sprayer



Fig.4: Rear view of the sprayer with the pressure regulation and filter unit.

positioned near the left and right side of the tank. The tank can be rinsed by a rotating rinsing nozzle, positioned in the centre of the tank. The rinsing liquid is coming from a 71 l tank. For the cleaning of the outer surfaces of the sprayer, a tube connector is located near the control centre. For to show the remaining spray liquid in the tank, a tube indicator is mounted at the left side of the tank.

The spray liquid is pressurized by a hydraulic driven Pentair Centrifugal pump type 93 HPS with measured 131 l/min at 4 bar and 75 l/min at 7 bar.

The boom has a working width of 5.5 m. The boom height can be fixed for a working height of 50 cm, it can't be changed during spraying, the adjustable range of working height is less than 20 cm, therefore the sprayer



Fig.5: Spray computer and switch box.

## Description of sprayer

can't be used in higher plants. It is specialized for spraying on low grass like golf courses. The boom works without slope compensation and pendulum device. The outer boom segments are equipped with an obstacle avoidance device (coil spring), so in case of obstacle contact, these segments can give way to the front or the rear. The tested version was not equipped with the optional available foam markers at the boom tips, to make the borders of the working width visible on the grass (see report D1849 from 2015). This would make it more easy to find the next track without spray gaps or overlapping areas between the tracks. The now tested version was equipped with an optional GPS position system „StarFire 6000“ which was not tested in this ENTAM test. For adjustment and control of the speed depending flow rate or pressure a John Deere Universal spray computer is mounted. Additionally to the computer panel a switch box for switching the single nozzles is present. With the computer the main functions for spraying, like boom folding, switching of section valves, start / stop of spraying can be handled. The intensity of the agitator can be adjusted by a bypass valve located and operated at the boom mounting.

<b>Result table</b>
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tested assembly				result (measured)	
spray tank	over volume contents gauge			16.5 %	* min. 5 %
			graduation marks	50 l	* max. 100 l
			deviation	-0.15 %	* max. 7.5 % between 70l and 140 l.
				-3.96 %	* max. 5 % between 140 l and 700 l
surface roughness				0.023 mm	* max 0.1 mm
rinsing tank	volume			71 l	*10 % of nominal volume
	rinsing and dilution possible?			yes	
	Cleaning performance (main tank) (concentration after cleaning)			734	Min.factor 400 of concentration before cleaning
can rinsing equipment		rinsing efficiency		no equipment mounted	* max. 0.01 % of can contents
manometer	graduation marks			electronic display	* max. 0.2 bar
	deviation			0.1 bar	* max. 0.2 bar
agitation system	deviation from even concentration			-9.9 %	*max. 15 %
residual in l		dilutable		8.9 l	* max. 14.5 l
		non dilutable		2.2 l	
spray boom	height adjustment range from - to nozzle ground contact protection			500 mm fixed	
	nozzle dripping after switch off			0 ml	* max. 2 ml
	pressure loss between manometer and nozzle at 3 bar pressure			5 %	* max. 10 %
	single nozzle flow rate				
		pressure (bar)	flow rate (l/min)	max. deviation from table in % *(max. 10 %)	max. deviation from mean in % *(max. 5 %)
		3.0	3.19	3.8	2.9
	transverse distribution				
		pressure (bar)	distance (cm)	coefficient of variation (%) *(max. 9 %)	
		2.0	50	1.8	
		3.0	50	1.97	
	4.0	50	1.76		
Measured with :				Syngenta Soil XC 08	

Tab.3: Result table

\* limit

Result table		
volume/hectare adjustment device		
repeatability of adjustment		
adjusted flow rate in l/ha	deviation from desired value % **	deviation from desired value % **
	ascending application rate	descending application rate
210	0.7	-0.3
300	2.6	1.9
390	2.3	2.9
procedure	regulation speed: deviation to adjusted value after 7 s	
switching on / off	3.2 s***	after 7 s
switching of single sections	4.8 s***	after 7 s
procedure	reaching steady state after varying conditions (s)	
change of driving speed by changing gears		steady state mean deviation
1.5 m/s to 2.0 m/s	0.7 s	*
2.0 m/s to 2.5 m/s	1.8 s	*
2.5 m/s to 2.0 m/s	1.8 s	*
2.0 m/s to 1.5 m/s	1.7 s	*

Tab.4: Result table 2.

\* limit: &lt; 10 % after 7 s

\*\* limit: max. 6 %

\*\*\*steady state reached

Explanation on testing:

Testing takes place according to the Technical Instructions for ENTAM-Tests of Field Crop Sprayers (Rel.5). This procedure was developed by the competent testing authorities of the European countries participating in ENTAM and is based on the standard EN ISO 16119. This test is only a technical performance test which takes place without an accompanying field test. The test results apply only to the tested appurtenances of the sprayer. Statements on the behaviour of the sprayer with different appurtenances cannot be derived from these results.



## Responsibility and recognition



Performing competent authority:  
 Julius Kühn-Institute (Germany)  
 Institute for Application Techniques in Plant Protection  
 Messeweg 11-12  
 D-38104 Braunschweig

### This test is recognized by the ENTAM members:



**HBLFA** Francisco Josephinum  
**BLT** Wieselburg  
 (Austria)

012/2019



**CMA** Generalitat de Catalunya  
 Centre de Mecanització Agrària (CMA)  
 (Spain)

EPH 08/19



**ENAMA** Ente Nazionale per la Meccanizzazione  
 (Italy)

ENTAM „Rapporto di Agricola  
 prova prestazionale“ 03/2019



**MGI** - Mezőgazdasági Gépesítési Intézet  
 (Hungary)

D-195/2019



**IRSTEA** - National Research Institute of Science  
 and Technology for Environment and Agriculture  
 (France)

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**PIMR** - Przemysłowy Instytut Maszyn  
 Rolniczych Industrial Institute of Agricultural  
 Engineering  
 (Poland)

PIMR-209/ENTAM/19