

ENTAM - Test Report



Sprayer type:
Trade mark:
Model:

Trailed field crop sprayer
Toselli
Cloud 2000

Manufacturer:
Toselli s.r.l.
Via Newton 17
40017 SAN GIOVANNI IN PERSICETO (BO)
ITALY

Test report: D - 2089

Assessment table

| No. | Contents | Assessment |
|-----|---|------------|
| 1 | Spray tank surface roughness | +++ |
| 2 | Spray tank over volume | ++ |
| 3 | Volume of total residual (here max. allowed 46 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 | + |
| 9 | Accuracy of pressure gauge | + |
| 10 | Accuracy of flow meter | see no.14 |
| 11 | Regulation speed ** | +++ |
| 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

**) stable within 7 s = +++

| 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 | % ** | >7-7.5 | >3-7 | 0-3 |
| 3 | of al-low.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 | times amount of dilutable residual ** | 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 | | | | | |

**) fulfill only > 10 % main tank

Free download of the test under: www.ENTAM.net
or www.julius-kuehn.de

Technical data of sprayer

- 18 m working width with air assistance.
- 7 hydraulic sections.
- Pendulum range up to 6.5 °.
- No slope compensation.
- Infinitely variable from 450 mm - 1770 mm.
- Air assistance with hydraulic driven axial fan (max. 91 dB(A)).

- 2000 l tank.
- 206 l rinsing water tank.
- 17 l handwash tank.



Fig.1: Overview.

- Pump Imovilli "D274" with 261 l/min at 6 bar for spray liquid.
- Hydraulic pump for fan and hydraulic functions.
- Steering drawbar.

- 1.5 m - 1.8 m track width.
- 550 mm ground clearance (tank) and 500 mm (drawbar) with 270/95 R 38 tyres.

Dimensions and weights :

| | |
|------------------|---------|
| total length: | 6200 mm |
| height: | 3015 mm |
| width: | 3200 mm |
| unloaded weight: | 2250 kg |

Description of sprayer



Fig.2: Unfolding of the boom.

The framework of the sprayer is made of steel profiles. The sprayer is designed for a road speed of 25 km/h without brakes and with a steering drawbar. The axle has an adjustable track width of 1.5 m - 1.8 m. The spray tank with a nominal volume of 2000 l is made of polythene. He keeps an over volume of ~ 10 % to hold back foam. The liquid level in the tank is indicated

by a float gauge with rope and tube indicator. The pressure agitation system in the spray tank consists of three baffle nozzles near the tank bottom. The clean water tank for rinsing and diluting holds a volume of 206 l. The hand wash tank for the operator has a volume of 17 l. The boom is a framework of steel profiles with the outer segments made of unpainted stainless steel. The boom can be adjusted with nozzles heights between 450 mm and 1770 mm. The folding and height adjustment of the boom are hydraulic driven. As a specialty the "CLA" boom is equipped with a hydraulic driven fan and an air tube for air assistance. This shall help to reduce the spray drift and to increase the penetration of the droplets if needed.



Fig.3: Air assistance tube with outlet openings at the bottom shall increase penetration and reduce drift.

Description of sprayer



Fig.4: Folded boom with air tube and axial fan (in the rear) for air assistance.

The air is stepless adjustable in a range of $\pm 15^\circ$ deviation to the vertical and in 10 steps regarding intensity. The loudness of the sprayer with active air assistance (7 m away) is up to 91 decibel. The pendulum device of the boom has a range of 6.5° a slope compensation feature is not installed.

The spray liquid application on the boom is splitted into 5 hydraulic sections and 8 individually switchable nozzles (the 4 outer nozzles of each side).

The pump for the hydraulic functions (including fan) and the spray liquid pump are positioned on top of the drawbar.

Located on the left side of the sprayer is a control centre and an induction bowl. The induction bowl offers 1 nozzle for flushing in.



Fig.5: Left sprayer side with induction bowl and control center.

Description of sprayer



Additionally the induction bowl is equipped with a rotating nozzle for the cleaning of plant protection cans and for the inner cleaning of the bowl.

All controls and instruments are located near the driver, they consist of the terminal "bravo 400s", the control box for the steering drawbar and a control box for the spray functions and hydraulic functions and the air support.

Fig.6: Spray computer terminal „bravo 400s“ with switchboards for operating the hydraulic, spraying and steering functions.

| |
|---------------------|
| Result table |
|---------------------|

| tested assembly | | | | result (measured) | |
|-----------------------|---|--------------------|------------------------|---|---|
| spray tank | over volume | | | 9.9 % | * min. 5 % |
| | contents gauge | | graduation marks | 50 l | * max. 100 l |
| | | | deviation | -1.3 % | * max. 7.5 % between 200l and 400 l. |
| | | | | -1.8 % | * max. 5 % between 400 l and 2000 l |
| surface roughness | | | 0.025 mm | * max 0.1 mm | |
| rinsing tank | volume | | | 206 l | *10 % of nominal volume |
| | rinsing and dilution possible? | | | yes | |
| | Cleaning performance (main tank) (concentration after cleaning) | | | 1152 | Min.factor 400 of concentration before cleaning |
| can rinsing equipment | | rinsing efficiency | | <0.01 % | * max. 0.01 % of can contents |
| manometer | graduation marks | | | 0.1 bar | * max. 0.2 bar |
| | deviation | | | 0.2 bar | * max. 0.2 bar |
| agitation system | deviation from even concentration | | | 11.6 % | *max. 15 % |
| residual in l | | dilutable | | 22.9 l | * max. 46 l |
| | | non dilutable | | 14.7 l | |
| spray boom | height adjustment range from - to | | | 450 mm - 1770 mm | |
| | nozzle ground contact protection | | | yes | |
| | pressure loss between manometer and nozzle at 5 bar pressure | | | -3.6 % | * max. 10 % |
| | nozzle dripping after switch off | | | 0 ml | * max. 2 ml |
| | 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 | 1.57 | -3.2 | 3.0 |
| | transverse distribution | | | | |
| | | pressure (bar) | distance (cm) | coefficient of variation (%) *(max. 9 %) | |
| | | 1.5 | 50 | 2.3 | |
| | 3.0 | 50 | 2.4 | | |
| | 6.0 | 50 | 2.5 | | |
| Measured with : | | | Lechler IDK 120-03 POM | | |

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 |
| 180 | 1 | 1 |
| 210 | 0.3 | 1.4 |
| 240 | 0.4 | 1.4 |
| <u>procedure</u> | regulation speed: deviation to adjusted value after 7 s | |
| <u>switching on / off</u> | 3.3 s*** | after 7 s |
| <u>switching of single sections</u> | 2.4 s*** | after 7 s |
| <u>procedure</u> | 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 | 3.0 s | * |
| 2.0 m/s to 2.5 m/s | 2.4 s | * |
| 2.5 m/s to 2.0 m/s | 2.7 s | * |
| 2.0 m/s to 1.5 m/s | 2.9 s | * |

Tab.4: Result table 2.

*) limit: < 10 % after 7 s

**) limit: m,ax. 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 043/17
BLT Wieselburg
 (Austria)



CMA Generalitat de Catalunya EPH 15/17
 Centre de Mecanització Agrària (CMA)
 (Spain)



ENAMA Ente Nazionale per la Meccanizzazione ENTAM „Rapporto di Agricola
 (Italy) prova prestazionale“ 13/2017



HIAE (MGI) Hungarian Institute of Agricultural D-162/2017
 Engineering
 (Hungary)



IRSTEA - National Research Institute of Science IRSTEA/CEMAGREF/ENTAM/
 and Technology for Environment and Agriculture 17/031
 (France) (formerly CEMAGREF)



PIMR - Przemyslowy Instytut Maszyn PIMR-177/ENTAM/17
 Rolniczych Industrial Institute of Agricultural
 Engineering
 (Poland)