USAGE REPORT

Vehicle:	SRBC 17	**Date:**	25/06/2026
Location:	Saint-Bardoux	**Missions:**	2

Mission 1

Trial date	2026-06-25
Location	Saint-Bardoux, Auvergne Rhône Alpes, France
Operator	Johan
Start time	09:00
End time	10:19
Weather	
Precipitation type	None
Temperature	40 °C
Sun position	Zenith
Terrain	
Slope	7 %
Cross slope	10 %
Soil	
Texture	Silty loam
Dominant particle size	Sand 0.05-2 mm
Moisture condition	Dry (hard)
Crop	
Species	Courgettes
Growth stage	Bare soil
Weed pressure	0 %
Planned operation	Hoeing
Adjacent environment	
Tall vegetation	Yes
Tall buildings	No
Metallic structures	No
Ditch or embankment	Yes
High voltage lines	No

Roads	No
No network zone	No
Robot configuration	
Robot weight	250 kg
Robot width	0.64 m
Tool	
Tool name	Bineuse
Tool type	Mounted
Tool weight	30 kg
Tool length	1.0 m
Tool width	0.6 m
Tool height	0.6 m
Tool total length	1.1 m
Working depth	0.05 m



Figure 1.1: Mission presentation photo

Mission presentation

Mission parameters	
Task to perform	Binage
Trajectory	Rectiligne, square turn
Working speed	2 km/h
Mission file	Courgettes.json

Organization	
Workforce	
Total number of employees	1
Surface	
Worked plot surface	0.0326 ha
Plot fragmentation	Consolidated (<0.5 km)

Trajectory

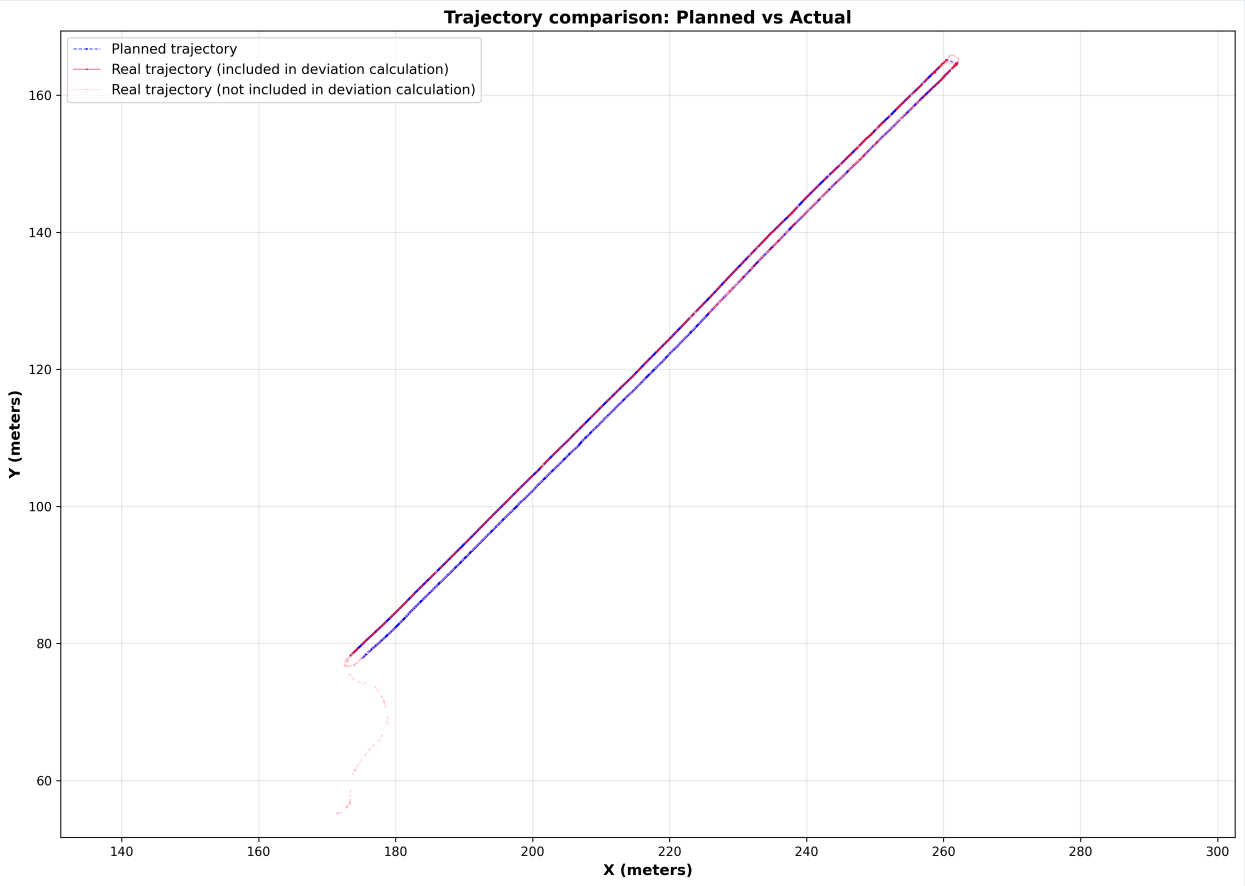


Figure 1.1: Planned vs actual trajectory comparison

Agronomic Summary

Energy per hectare	8.17 kWh/ha

Work rate	0.02 ha/h
Autonomy per battery	0.31 ha/batterie

Time tracking

Tool setup	5 min
GPS connection wait	0 min
Wi-Fi connection wait	0 min
Supervision time	60 min
Travel time	0 min
Restart count	0
Stop count	0

Work assessment

Quality assessment	Very satisfied
Crop damage	None

Before work



After work



Performance Indicators

Agronomic [1]

Indicator	Value	Unit
Crop species	`Courgettes`	
Growth stage	`Bare soil`	
Soil texture	`Silty loam`	
Soil moisture	`Dry (hard)`	
Weed pressure	`0`	%
Planned operation	`Hoeing`	
Work quality assessment	`Very satisfied`	

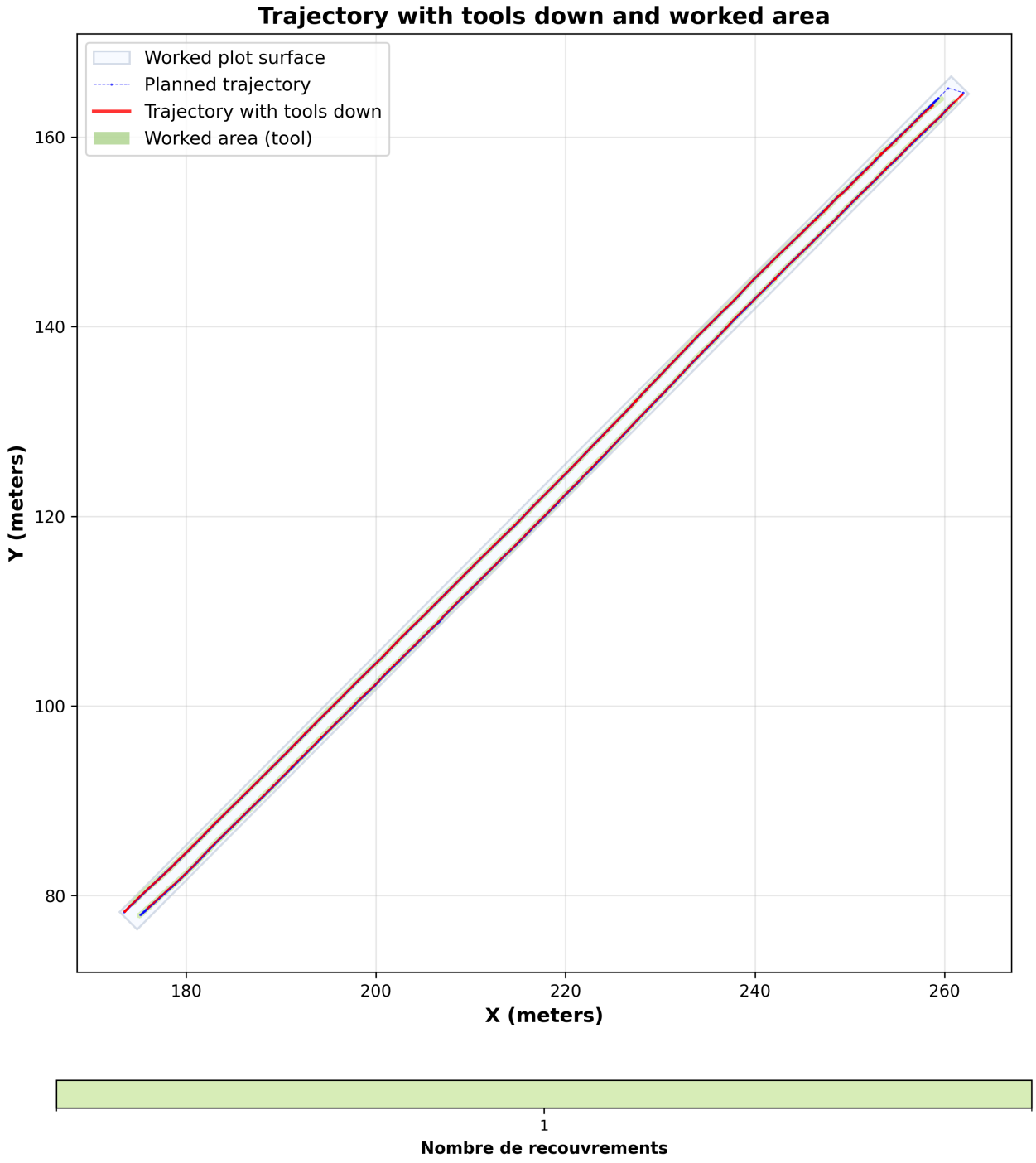
Indicator	Value	Unit
Crop damage	None	

Energy [2]

Indicator	Value	Unit
SOC at start	52.61	%
SOC at end	44.77	%
Total discharge [3] *For a battery pack capacity of: 2.54 kWh*	10.04	%
Total energy consumed	0.26	kWh
Average power	0.19	kW
Energy per hectare	8.17	kWh/ha
Autonomy per battery *Reference battery: 2.54 kWh*	0.31	ha/batterie

Work Rate [4]

Indicator	Value	Unit
Work rate [5]	0.02	ha/h
Area covered [6]	0.03	ha
Worked plot surface [7]	0.03	ha
Worked area [8]	0.01	ha
Effective area [9]	0.01	ha
Coverage rate [10]	0.00	%
Average speed (km/h)	0.60	km/h
Max speed (km/h)	3.50	km/h



Economic [11]

Indicator	Value	Unit
Electricity price	0.19	€/kWh
Labor cost per hour	18.00	€/h
Employees assigned	0	
Labor cost per hectare	0.00	€/ha
Energy cost	0.05	€
Energy cost per hectare	1.55	€/ha

Indicator	Value	Unit
Total cost	0.05	€
Total cost per hectare	1.55	€/ha

Environmental [12]

Indicator	Value	Unit
Temperature	40	°C
Precipitation type	None	
CO_2 emissions [13] *Emission factor applied: 317 g CO_2 per kWh.*	0.08	kg
Plot fragmentation	Consolidated (<0.5 km)	

Mission [14]

Indicator	Value	Unit
Planned distance [15]	247.34	m
Performed distance [16]	488.32	m
Distance deviation	240.98	m
Performed distance (%)	197.43	%
Mean lateral deviation *Without half-turn*	3.22	cm
Max lateral deviation *Without half-turn*	19.97	cm
Mean lateral deviation (tool) *Without half-turn, tool distance: 110 cm*	4.46	cm
Max lateral deviation (tool) *Without half-turn, tool distance: 110 cm*	19.98	cm
Worked rows [17]	2	

Operational [18]

Indicator	Value	Unit
Robot weight	250.00	kg
Tool weight	30.00	kg
Total weight	280.00	kg
Energy per kg per hectare	0.03	kWh/kg/ha
Mean torque at work (% of nominal) [19] *Reference nominal torque: 2.39 N·m — Number of motors: 2.*	35.81	%

Safety [20]

Indicator	Value	Unit
Geofencing exits	1	
Time outside geofencing (seconds)	2645.52	s
Time outside geofencing (hours)	0.73	h
Local emergency stops	0	
Remote emergency stops	0	
Bumper activations	0	

Reliability [21]

Indicator	Value	Unit
Output errors	0	
Input errors	0	
Battery errors	0	
Motor errors	1	
Cylinder errors	1	
Total errors	2	
Output error time (seconds)	0.00	s
Input error time (seconds)	0.00	s
Battery error time (seconds)	0.00	s
Motor error time (seconds)	12.17	s
Cylinder error time (seconds)	11.84	s
Total error time (seconds)	12.48	s
Error rate per hour	1.52	/h
System availability	99.74	%

Localization [22]

Indicator	Value	Unit
Localization errors	2	
Error time (seconds)	12.29	s
Error time (hours)	0.00	h

Time [23]

Indicator	Value	Unit
Total duration	4741.92	s

Indicator	Value	Unit
Total duration (hours)	1.32	h
Active time	2417.17	s
Active time (hours)	0.67	h
Inactive time	2324.75	s
Inactive time (hours)	0.65	h
Active time (%)	50.97	%
Inactive time (%)	49.03	%

Mission 2

Trial date	2026-06-25
Location	Saint-Bardoux, Auvergne Rhône Alpes, France
Operator	Johan
Start time	10:20
End time	11:46
Weather	
Precipitation type	None
Temperature	40 °C
Sun position	Zenith
Terrain	
Slope	3 %
Cross slope	3 %
Soil	
Texture	Silty loam
Dominant particle size	Sand 0.05-2 mm
Moisture condition	Dry (hard)
Crop	
Species	Courgettes
Growth stage	Bare soil
Weed pressure	0 %
Planned operation	Sowing
Adjacent environment	
Tall vegetation	Yes
Tall buildings	No
Metallic structures	No
Ditch or embankment	Yes
High voltage lines	No
Roads	No
No network zone	No
Robot configuration	
Robot weight	250 kg
Robot width	0.64 m

Tool	
Tool name	Semoir
Tool type	Mounted
Tool weight	10 kg
Tool length	1.0 m
Tool width	0.2 m
Tool height	0.6 m
Tool total length	1.1 m
Working depth	0.05 m



Figure 2.1: Mission presentation photo

Mission presentation

Mission parameters	
Task to perform	Semis
Trajectory	Rectiligne, square turn
Working speed	0.8 km/h
Mission file	Semis courgette .json

Organization
Workforce

Total number of employees	1

Surface

Worked plot surface	0.0331 ha
Plot fragmentation	Consolidated (<0.5 km)

Trajectory

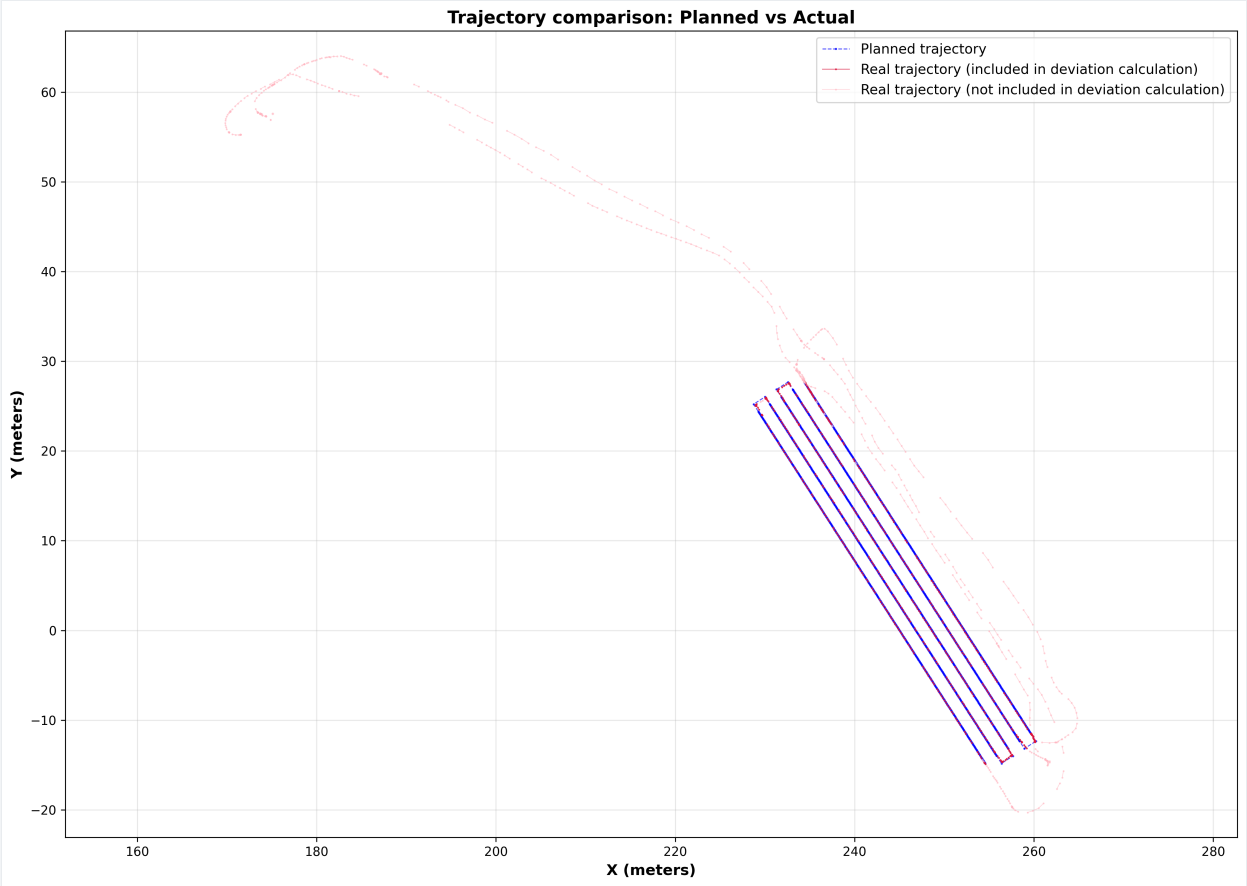


Figure 2.1: Planned vs actual trajectory comparison

Agronomic Summary

Energy per hectare	4.91 kWh/ha
Work rate	0.03 ha/h
Autonomy per battery	0.52 ha/batterie

Time tracking

Tool setup	5 min
GPS connection wait	0 min
Wi-Fi connection wait	0 min
Supervision time	60 min
Travel time	0 min
Restart count	0

Stop count	0

Work assessment

Quality assessment	Very satisfied
Crop damage	None

Before work



After work



Performance Indicators

Agronomic [1]

Indicator	Value	Unit
Crop species	Courgettes	
Growth stage	Bare soil	
Soil texture	Silty loam	
Soil moisture	Dry (hard)	
Weed pressure	0	%
Planned operation	Sowing	
Work quality assessment	Very satisfied	
Crop damage	None	

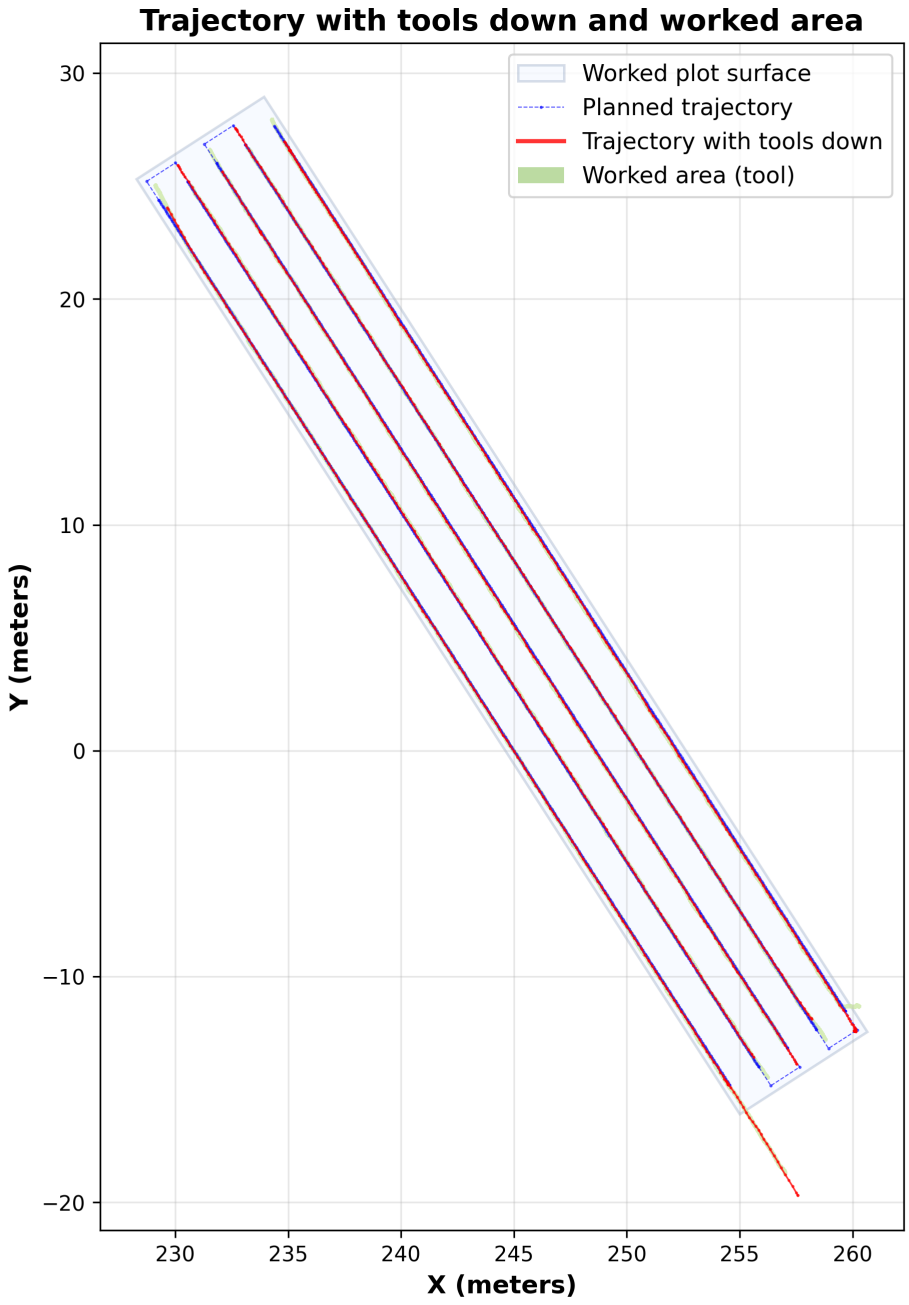
Energy [2]

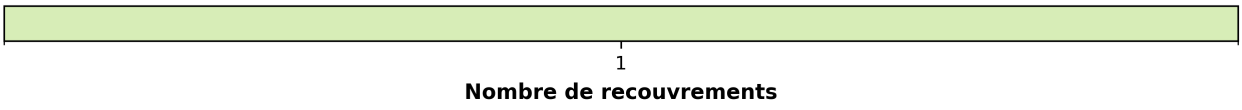
Indicator	Value	Unit
SOC at start	44.77	%
SOC at end	36.70	%
Total discharge [3] *For a battery pack capacity of: 2.54 kWh*	7.65	%
Total energy consumed	0.19	kWh

Indicator	Value	Unit
Average power	0.14	kW
Energy per hectare	4.91	kWh/ha
Autonomy per battery *Reference battery: 2.54 kWh*	0.52	ha/batterie

Work Rate [4]

Indicator	Value	Unit
Work rate [5]	0.03	ha/h
Area covered [6]	0.04	ha
Worked plot surface [7]	0.03	ha
Worked area [8]	0.00	ha
Effective area [9]	0.00	ha
Coverage rate [10]	0.00	%
Average speed (km/h)	1.17	km/h
Max speed (km/h)	3.50	km/h





Economic [11]

Indicator	Value	Unit
Electricity price	0.19	€/kWh
Labor cost per hour	18.00	€/h
Employees assigned	0	
Labor cost per hectare	0.00	€/ha

Indicator	Value	Unit
Energy cost	0.04	€
Energy cost per hectare	0.93	€/ha
Total cost	0.04	€
Total cost per hectare	0.93	€/ha

Environmental [12]

Indicator	Value	Unit
Temperature	40	°C
Precipitation type	None	
CO_2 emissions [13] *Emission factor applied: 317 g CO_2 per kWh.*	0.06	kg
Plot fragmentation	Consolidated (<0.5 km)	

Mission [14]

Indicator	Value	Unit
Planned distance [15]	247.23	m
Performed distance [16]	619.08	m
Distance deviation	371.86	m
Performed distance (%)	250.41	%
Mean lateral deviation *Without half-turn*	6.32	cm
Max lateral deviation *Without half-turn*	19.94	cm
Mean lateral deviation (tool) *Without half-turn, tool distance: 110 cm*	5.80	cm
Max lateral deviation (tool) *Without half-turn, tool distance: 110 cm*	19.99	cm
Worked rows [17]	5	

Operational [18]

Indicator	Value	Unit
Robot weight	250.00	kg
Tool weight	10.00	kg
Total weight	260.00	kg
Energy per kg per hectare	0.02	kWh/kg/ha

Indicator	Value	Unit
Mean torque at work (% of nominal) [19] *Reference nominal torque: 2.39 N·m — Number of motors: 2.*	31.82	%

Safety [20]

Indicator	Value	Unit
Geofencing exits	0	
Time outside geofencing (seconds)	0.00	s
Time outside geofencing (hours)	0.00	h
Local emergency stops	0	
Remote emergency stops	0	
Bumper activations	0	

Reliability [21]

Indicator	Value	Unit
Output errors	0	
Input errors	0	
Battery errors	0	
Motor errors	0	
Cylinder errors	0	
Total errors	0	
Output error time (seconds)	*N/A*	s
Input error time (seconds)	*N/A*	s
Battery error time (seconds)	*N/A*	s
Motor error time (seconds)	*N/A*	s
Cylinder error time (seconds)	*N/A*	s
Total error time (seconds)	*N/A*	s
Error rate per hour	0.00	/h
System availability	*N/A*	%

Localization [22]

Indicator	Value	Unit
Localization errors	27	
Error time (seconds)	697.00	s
Error time (hours)	0.19	h

Time [23]

Indicator	Value	Unit
Total duration	4796.16	s
Total duration (hours)	1.33	h
Active time	2344.30	s
Active time (hours)	0.65	h
Inactive time	2451.86	s
Inactive time (hours)	0.68	h
Active time (%)	48.88	%
Inactive time (%)	51.12	%

Descriptions of indicators

Bracketed numbers refer to definitions, assumptions and sources listed below.

[1] Agronomic indicator: value from the recorded crop trial context.

[2] Energy indicator: derived from electrical measurements, consumption and SOC logged during the mission.

[3] Total discharge (%): energy consumed during the mission (change in cumulative energy, in kWh) divided by nominal battery pack capacity (kWh), multiplied by 100. This indicator does not use start or end SOC; reference pack capacity is stated in the note when known.

[4] Work-rate indicator: derived from worked areas, speeds and time on field.

[5] Work rate: amount of work completed per unit of time, in ha/h. Hourly rate = area covered (ha) ÷ total mission duration (h).

[6] Area covered: this is the area swept by the robot = cumulative odometric distance × robot width.

[7] Worked plot surface: area of the plot worked by the robot. It is modeled as an oriented bounding box (OBB) with a margin equal to half the robot width around the planned trajectory that was worked.

[8] Worked area: area processed by the implement (tool width × path length with implement lowered). Each pass counts; overlaps add up.

[9] Effective area: area worked by the implement excluding overlaps.

[10] Coverage rate: ratio of worked area to effective area. (worked area − effective area) / effective area × 100. A high value indicates many passes over the same zones.

[11] Economic indicator: computed from cost settings and mission energy/time aggregates.

[12] Environmental indicator: derived from weather context or consumption using the documented method.

[13] CO_2 emissions from grid electricity consumed during the mission (kWh × 0.317 kg/kWh). Source: French Ministry for Ecological Transition — Key Climate Figures (digital edition), chapter on GHG emissions from industry / electricity production (statistiques.developpement-durable.gouv.fr).

[14] Mission indicator: derived from actual path, plan and computed geometric deviations.

[15] Theoretical mission distance: cumulative length of the planned trajectory from the mission JSON file. Does not match the robot's actual path.

[16] Distance actually traveled by the robot. May include movement before the mission effectively starts and after it ends, depending on the recorded data.

[17] Number of distinct rows worked (tool lowered).

[18] Operational indicator: derived from kinematics, implement data or documented masses.

[19] Mean absolute motor torque only when the tool is lowered, as a percentage of the motors' nominal torque.

[20] Safety indicator: derived from safety-related events and durations.

[21] Reliability indicator: derived from fault codes and error time per subsystem.

[22] Localization indicator: derived from localization faults or downtime during the mission.

[23] Time indicator: derived from timestamps and activity states during the mission.