

# USAGE REPORT

Vehicle: SRBC 17

Date: 04/05/2026

Location: SABI AGRI

Missions: 1

## Mission 1

**Trial date** 2026-05-04

**Location** SABI AGRI, Auvergne, France

**Operator** Nicolas

**Start time** 10:10

**End time** 17:01

### Weather

**Precipitation type** Rain

**Temperature** 14 °C

### Terrain

**Slope** 0 %

**Cross slope** 0 %

### Soil

**Texture** Clay loam

**Dominant particle size** Blocks >200 mm

**Moisture condition** Wet (semi-plastic)

### Crop

**Species** Radis et Carottes

**Growth stage** Maturity

**Weed pressure** 20 %

**Planned operation** Scraping

### Adjacent environment

**Tall vegetation** No

**Tall buildings** No

**Metallic structures** Yes

**Ditch or embankment** Yes

**High voltage lines** No

**Roads** No

<b>No network zone</b>	No
<b>Robot configuration</b>	
<b>Robot weight</b>	220 kg
<b>Robot width</b>	0.64 m
<i>Tool</i>	
<b>Tool name</b>	Herse Etri
<b>Tool type</b>	Trailed
<b>Tool weight</b>	15 kg
<b>Tool length</b>	0.6 m
<b>Tool width</b>	0.64 m
<b>Tool height</b>	0.6 m
<b>Tool total length</b>	1.1 m
<b>Working depth</b>	0.08 m



Figure 1.1: Mission presentation photo

## Mission presentation

### Mission parameters

<b>Task to perform</b>	Grattage chardons
<b>Trajectory</b>	Rectiligne, square turn
<b>Working speed</b>	1.8 km/h
<b>Mission file</b>	Interrangboucle03.json

### Organization

<i>Workforce</i>	
<b>Total number of employees</b>	1
<i>Surface</i>	
<b>Theoretical surface of the plot</b>	0.08 ha

<b>Worked plot surface</b>	0.0984 ha
<b>Plot fragmentation</b>	Consolidated (<0.5 km)

## Trajectory

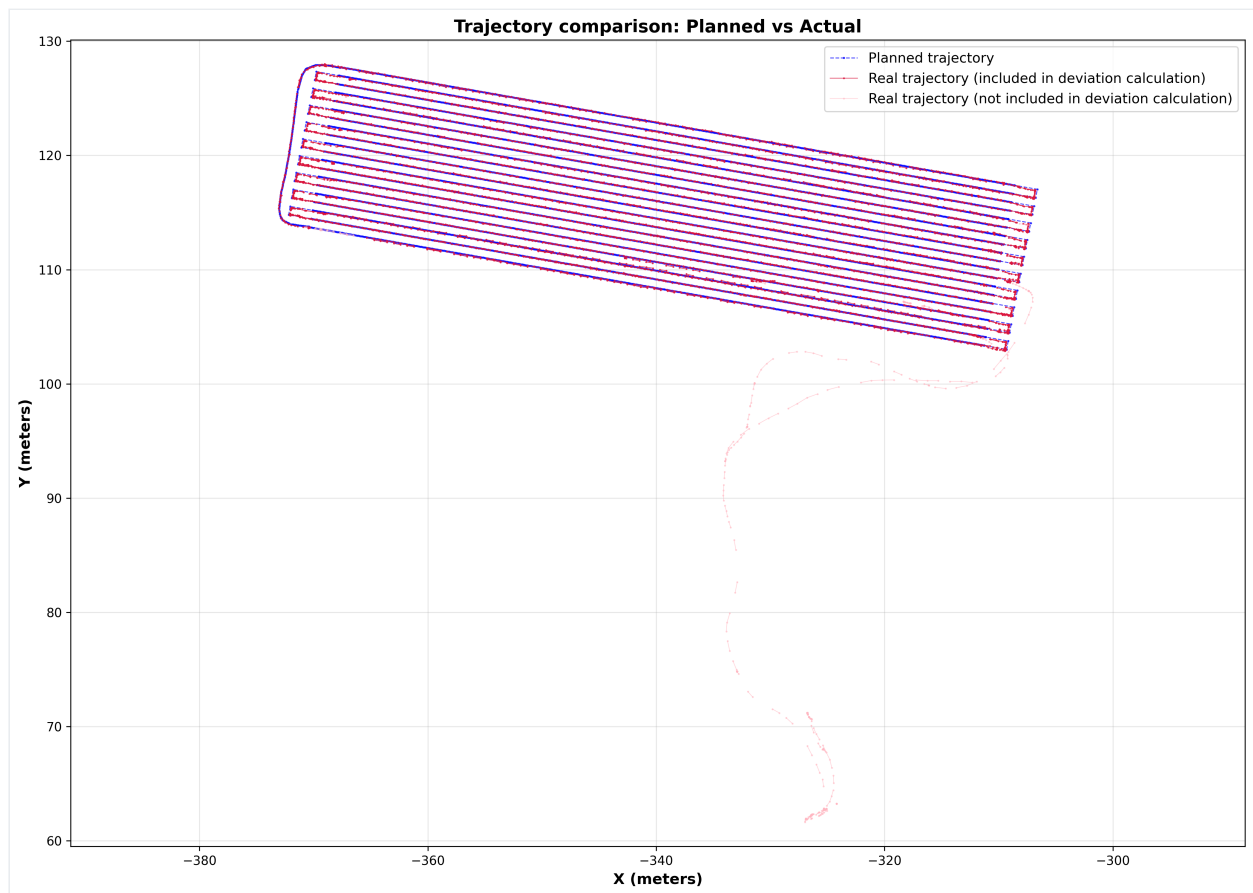


Figure 1.1: Planned vs actual trajectory comparison

## Agronomic Summary

<b>Energy per hectare</b>	6.40 kWh/ha
<b>Work rate</b>	0.04 ha/h
<b>Autonomy per battery</b>	0.40 ha/batterie

### Time tracking

<b>Tool setup</b>	5 min
<b>GPS connection wait</b>	10 min
<b>Wi-Fi connection wait</b>	0 min
<b>Supervision time</b>	10 min
<b>Travel time</b>	5 min
<b>Restart count</b>	1
<b>Stop count</b>	3
<b>Stop causes</b>	Perte RTK

## Work assessment

Quality assessment	Neutral
Crop damage	Medium (5 m)

Before work



After work



## Performance Indicators

### Agronomic <sup>[1]</sup>

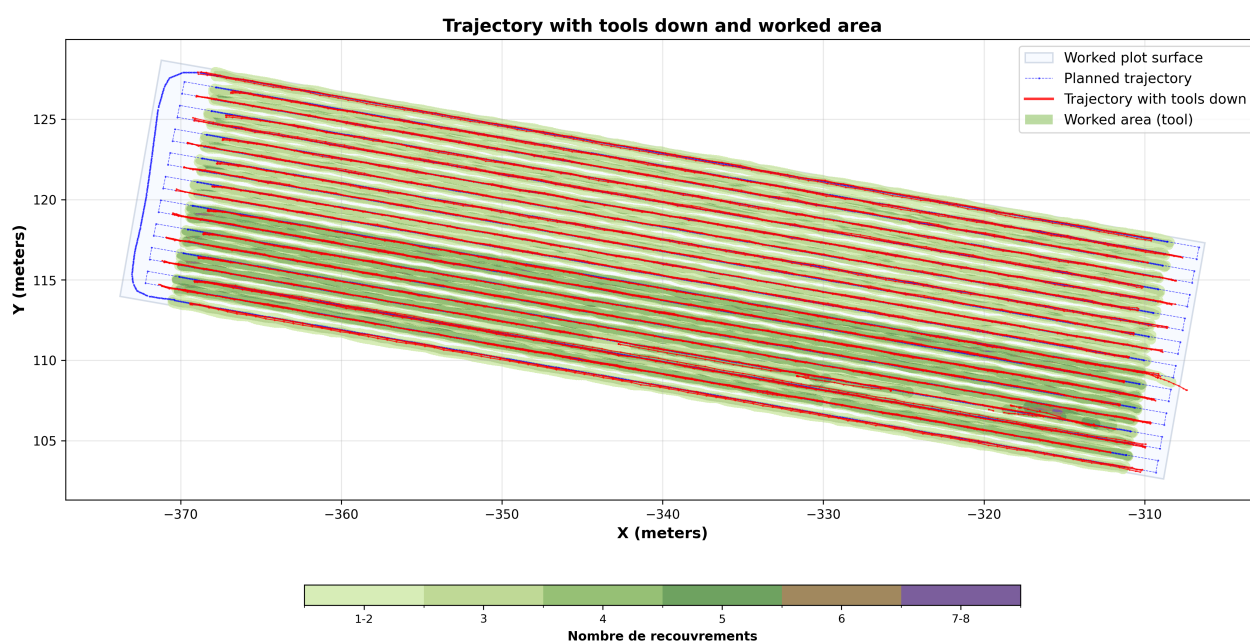
Indicator	Value	Unit
Crop species	<b>Radis et Carottes</b>	
Growth stage	<b>Maturity</b>	
Soil texture	<b>Clay loam</b>	
Soil moisture	<b>Wet (semi-plastic)</b>	
Weed pressure	<b>20</b>	%
Planned operation	<b>Scraping</b>	
Work quality assessment	<b>Neutral</b>	
Crop damage	<b>Medium (5 m)</b>	

### Energy <sup>[2]</sup>

Indicator	Value	Unit
SOC at start	<b>98.64</b>	%
SOC at end	<b>100.00</b>	%
Total discharge <sup>[3]</sup> <i>For a battery pack capacity of: 2.54 kWh</i>	<b>74.32</b>	%
Total energy consumed	<b>1.89</b>	kWh
Average power	<b>0.28</b>	kW
Energy per hectare	<b>6.40</b>	kWh/ha
Autonomy per battery <i>Reference battery: 2.54 kWh</i>	<b>0.40</b>	ha/batterie

## Work Rate <sup>[4]</sup>

Indicator	Value	Unit
Work rate <sup>[5]</sup>	<b>0.04</b>	ha/h
Area covered <sup>[6]</sup>	<b>0.30</b>	ha
Worked plot surface <sup>[7]</sup>	<b>0.10</b>	ha
Worked area <sup>[8]</sup>	<b>0.26</b>	ha
Effective area <sup>[9]</sup>	<b>0.09</b>	ha
Coverage rate <sup>[10]</sup>	<b>201.24</b>	%
Average speed (km/h)	<b>1.41</b>	km/h
Max speed (km/h)	<b>3.60</b>	km/h



## Economic <sup>[11]</sup>

Indicator	Value	Unit
Electricity price	<b>0.19</b>	€/kWh
Labor cost per hour	<b>18.00</b>	€/h
Employees assigned	<b>0</b>	
Labor cost per hectare	<b>0.00</b>	€/ha
Energy cost	<b>0.36</b>	€
Energy cost per hectare	<b>1.22</b>	€/ha
Total cost	<b>0.36</b>	€
Total cost per hectare	<b>1.22</b>	€/ha

## Environmental <sup>[12]</sup>

Indicator	Value	Unit
Temperature	14	°C
Precipitation type	Rain	
CO <sub>2</sub> emissions <sup>[13]</sup> <i>Emission factor applied: 317 g CO<sub>2</sub> per kWh.</i>	0.60	kg
Plot fragmentation	Consolidated (<0.5 km)	

## Mission <sup>[14]</sup>

Indicator	Value	Unit
Planned distance <sup>[15]</sup>	1308.97	m
Performed distance <sup>[16]</sup>	4614.04	m
Distance deviation	3305.07	m
Performed distance (%)	352.49	%
Mean lateral deviation <i>Without half-turn</i>	4.01	cm
Max lateral deviation <i>Without half-turn</i>	19.86	cm
Mean lateral deviation (tool) <i>Without half-turn, tool distance: 110 cm</i>	6.58	cm
Max lateral deviation (tool) <i>Without half-turn, tool distance: 110 cm</i>	19.96	cm
Worked rows <sup>[17]</sup>	21	

## Operational <sup>[18]</sup>

Indicator	Value	Unit
Robot weight	220.00	kg
Tool weight	15.00	kg
Total weight	235.00	kg
Energy per kg per hectare	0.03	kWh/kg/ha
Mean torque at work (% of nominal) <sup>[19]</sup> <i>Reference nominal torque: 2.39 N·m — Number of motors: 2.</i>	40.57	%

## Safety <sup>[20]</sup>

Indicator	Value	Unit
Geofencing exits	2	

Indicator	Value	Unit
Time outside geofencing (seconds)	<b>1358.23</b>	s
Time outside geofencing (hours)	<b>0.38</b>	h
Local emergency stops	<b>0</b>	
Remote emergency stops	<b>0</b>	
Bumper activations	<b>0</b>	

### Reliability <sup>[21]</sup>

Indicator	Value	Unit
Output errors	<b>0</b>	
Input errors	<b>0</b>	
Battery errors	<b>0</b>	
Motor errors	<b>0</b>	
Cylinder errors	<b>1</b>	
Total errors	<b>1</b>	
Output error time (seconds)	<b>0.00</b>	s
Input error time (seconds)	<b>0.00</b>	s
Battery error time (seconds)	<b>0.00</b>	s
Motor error time (seconds)	<b>0.00</b>	s
Cylinder error time (seconds)	<b>0.10</b>	s
Total error time (seconds)	<b>0.10</b>	s
Error rate per hour	<b>0.15</b>	/h
System availability	<b>100.00</b>	%

### Localization <sup>[22]</sup>

Indicator	Value	Unit
Localization errors	<b>55</b>	
Error time (seconds)	<b>10956.98</b>	s
Error time (hours)	<b>3.04</b>	h

### Time <sup>[23]</sup>

Indicator	Value	Unit
Total duration	<b>24633.85</b>	s
Total duration (hours)	<b>6.84</b>	h
Active time	<b>10484.44</b>	s

Indicator	Value	Unit
Active time (hours)	<b>2.91</b>	h
Inactive time	<b>14149.41</b>	s
Inactive time (hours)	<b>3.93</b>	h
Active time (%)	<b>42.56</b>	%
Inactive time (%)	<b>57.44</b>	%

## 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.  $(\text{worked area} - \text{effective area}) / \text{effective area} \times 100$ . 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<sub>2</sub> 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](https://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.