

USAGE REPORT

Vehicle: SRBC TEST

Date: 18/03/2026

Location: SABI AGRI

Missions: 3

Mission 1

Trial date 2026-03-18

Location SABI AGRI, Auvergne, France

Operator Nicolas

Start time 09:40

End time 15:34

Weather

Precipitation type None

Temperature 17 °C

Sun position Zenith

Terrain

Slope 0 %

Cross slope 0 %

Soil

Texture Clay loam

Dominant particle size Stones 20-200 mm

Moisture condition Friable (optimal)

Crop

Species Carottes et Radis

Growth stage Emergence

Weed pressure 5 %

Planned operation Scraping

Adjacent environment

Tall vegetation No

Tall buildings No

Metallic structures Yes

Ditch or embankment Yes

High voltage lines No

Roads	No
No network zone	No
Robot configuration	
Robot weight	280 kg
Robot width	0.64 m
<i>Tool</i>	
Tool name	Herse Etri
Tool type	Trailed
Tool weight	15 kg
Tool length	0.8 m
Tool width	0.6 m
Tool height	0.6 m
Tool total length	1.1 m
Working depth	0.07 m



Figure 1.1: Mission presentation photo

Mission presentation

Mission parameters

Task to perform	Grattage
Trajectory	Rectiligne, square turn, Boucle
Working speed	3 km/h
Mission file	mission_complete_inter_rang_boucle.json

Organization

<i>Workforce</i>	
Total number of employees	1
<i>Surface</i>	
	0.08 ha

Theoretical surface of the plot

Worked plot surface 0.0984 ha

Plot fragmentation Consolidated (<0.5 km)

Trajectory

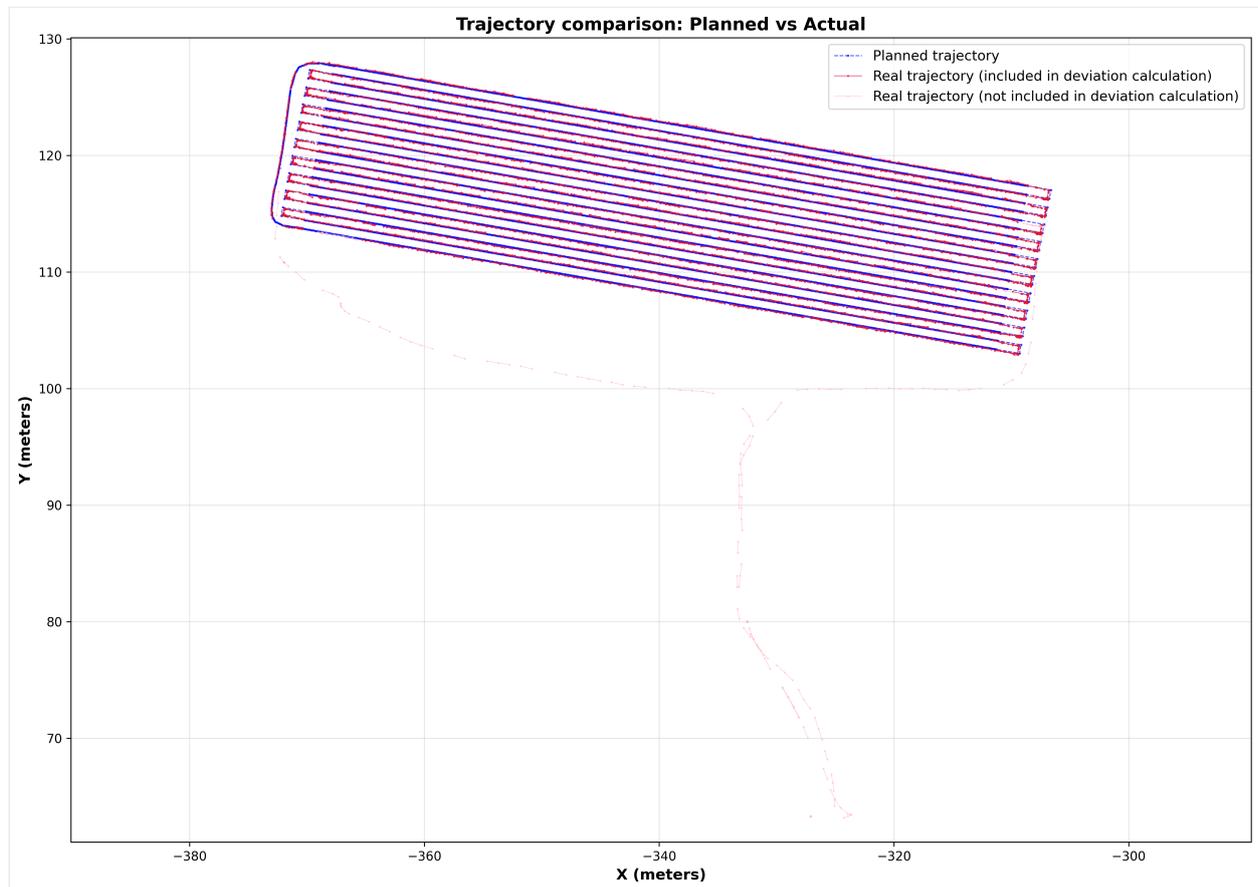


Figure 1.1: Planned vs actual trajectory comparison

Agronomic Summary

Energy per hectare 5.72 kWh/ha

Work rate 0.06 ha/h

Autonomy per battery 0.44 ha/batterie

Time tracking

Tool setup 0 min

GPS connection wait 10 min

Wi-Fi connection wait 0 min

Supervision time 5 min

Travel time 5 min

Restart count 2

Stop count	2
Stop causes	charge du robot; Arrêt caméra faux positif; redémarrage pour fix du rtk
Work assessment	
Quality assessment	Neutral
Crop damage	Low

Before work



After work



Performance Indicators

Agronomic ^[1]

Indicateur	Valeur	Unité
Crop species	Carottes et Radis	
Growth stage	Emergence	
Soil texture	Clay loam	
Soil moisture	Friable (optimal)	
Weed pressure	5	%
Planned operation	Scraping	
Work quality assessment	Neutral	
Crop damage	Low	

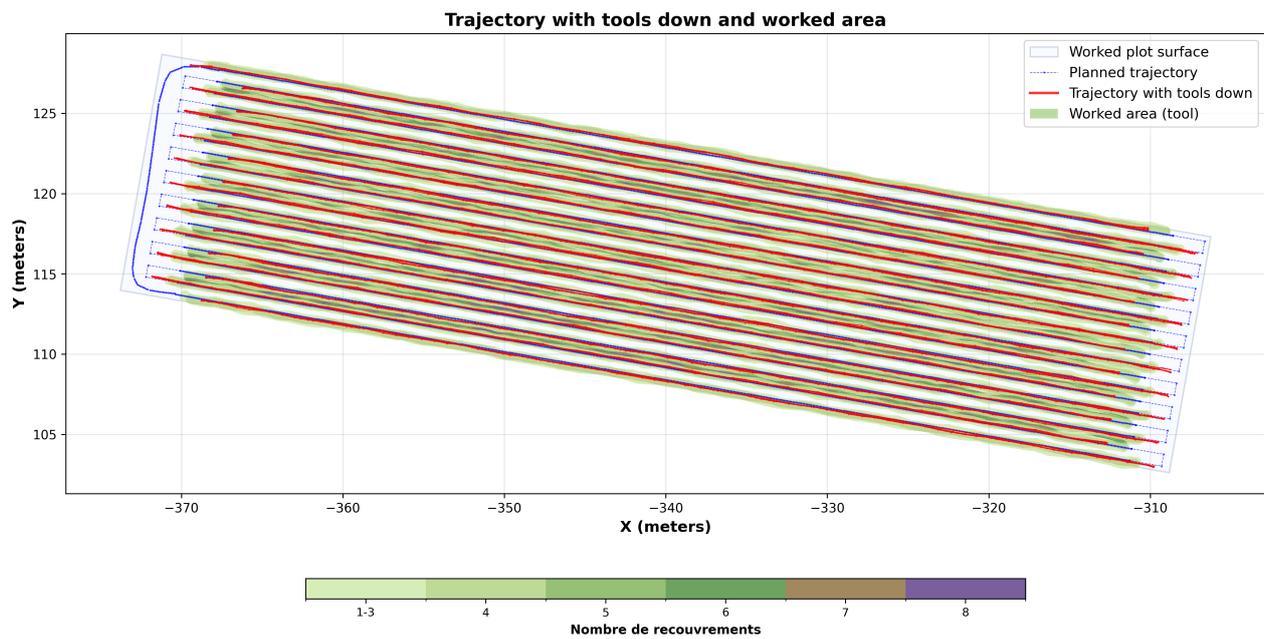
Energy ^[2]

Indicateur	Valeur	Unité
SOC at start	62.20	%
SOC at end	69.70	%
Total discharge ^[3] <i>For a battery pack capacity of: 2.54 kWh</i>	78.99	%
Total energy consumed	2.01	kWh
Average power	0.35	kW

Indicateur	Valeur	Unité
Energy per hectare	5.72	kWh/ha
Autonomy per battery <i>Reference battery: 2.54 kWh</i>	0.44	ha/batterie

Work Rate ^[4]

Indicateur	Valeur	Unité
Work rate ^[5]	0.06	ha/h
Area covered ^[6]	0.35	ha
Worked plot surface ^[7]	0.10	ha
Worked area ^[8]	0.29	ha
Effective area ^[9]	0.08	ha
Coverage rate ^[10]	277.31	%
Average speed (km/h)	1.77	km/h
Max speed (km/h)	3.60	km/h



Economic ^[11]

Indicateur	Valeur	Unité
Electricity price	0.19	€/kWh
Labor cost per hour	18.00	€/h
Employees assigned	0	
Labor cost per hectare	0.00	€/ha

Indicateur	Valeur	Unité
Energy cost	0.38	€
Energy cost per hectare	1.09	€/ha
Total cost	0.38	€
Total cost per hectare	1.09	€/ha

Environmental ^[12]

Indicateur	Valeur	Unité
Temperature	17	°C
Precipitation type	None	
CO ₂ emissions ^[13] <i>Emission factor applied: 317 g CO₂ per kWh.</i>	0.64	kg
Plot fragmentation	Consolidated (<0.5 km)	

Mission ^[14]

Indicateur	Valeur	Unité
Planned distance ^[15]	1308.97	m
Performed distance ^[16]	5490.98	m
Distance deviation	4182.01	m
Performed distance (%)	419.49	%
Mean lateral deviation <i>Without half-turn</i>	7.48	cm
Max lateral deviation <i>Without half-turn</i>	19.95	cm
Mean lateral deviation (tool) <i>Without half-turn, tool distance: 110 cm</i>	9.18	cm
Max lateral deviation (tool) <i>Without half-turn, tool distance: 110 cm</i>	20.00	cm
Worked rows ^[17]	21	

Operational ^[18]

Indicateur	Valeur	Unité
Robot weight	280.00	kg
Tool weight	15.00	kg
Total weight	295.00	kg
Energy per kg per hectare	0.02	kWh/kg/ha

Indicateur	Valeur	Unité
Mean torque at work (% of nominal) ^[19] <i>Reference nominal torque: 2.39 N·m — Number of motors: 2.</i>	40.88	%

Safety ^[20]

Indicateur	Valeur	Unité
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]

Indicateur	Valeur	Unité
Output errors	0	
Input errors	0	
Battery errors	0	
Motor errors	2	
Cylinder errors	2	
Total errors	4	
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)	381.07	s
Cylinder error time (seconds)	381.41	s
Total error time (seconds)	382.91	s
Error rate per hour	0.71	/h
System availability	98.12	%

Localization ^[22]

Indicateur	Valeur	Unité
Localization errors	12	
Error time (seconds)	7955.82	s
Error time (hours)	2.21	h

Time ^[23]

Indicateur	Valeur	Unité
Total duration	20377.10	s
Total duration (hours)	5.66	h
Active time	9805.80	s
Active time (hours)	2.72	h
Inactive time	10571.30	s
Inactive time (hours)	2.94	h
Active time (%)	48.12	%
Inactive time (%)	51.88	%

Mission 2

Trial date	2026-03-18
Location	SABI AGRI, Auvergne, France
Operator	Nicolas
Start time	15:35
End time	16:29

Weather

Precipitation type	None
Temperature	17 °C
Sun position	Zenith

Terrain

Slope	0 %
Cross slope	0 %

Soil

Texture	Clay loam
Dominant particle size	Stones 20-200 mm
Moisture condition	Friable (optimal)

Crop

Species	Carottes et Radis
Growth stage	Soil preparation
Weed pressure	5 %
Planned operation	Soil preparation

Adjacent environment

Tall vegetation	No
Tall buildings	No
Metallic structures	Yes
Ditch or embankment	Yes
High voltage lines	No
Roads	No
No network zone	No

Robot configuration

Robot weight	280 kg
Robot width	0.64 m

Tool

Tool name	Bineuse, 4 puis 2 dents
Tool type	Trailed
Tool weight	30 kg
Tool length	0.8 m
Tool width	0.6 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	Préparation du sol
Trajectory	Rectiligne, square turn
Working speed	1.8 km/h
Mission file	faux_semis_1_2.json

Organization

Workforce

Total number of employees	1
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Surface

Theoretical surface of the plot	0.08 ha
Worked plot surface	0.1047 ha
Plot fragmentation	Consolidated (<0.5 km)

Trajectory

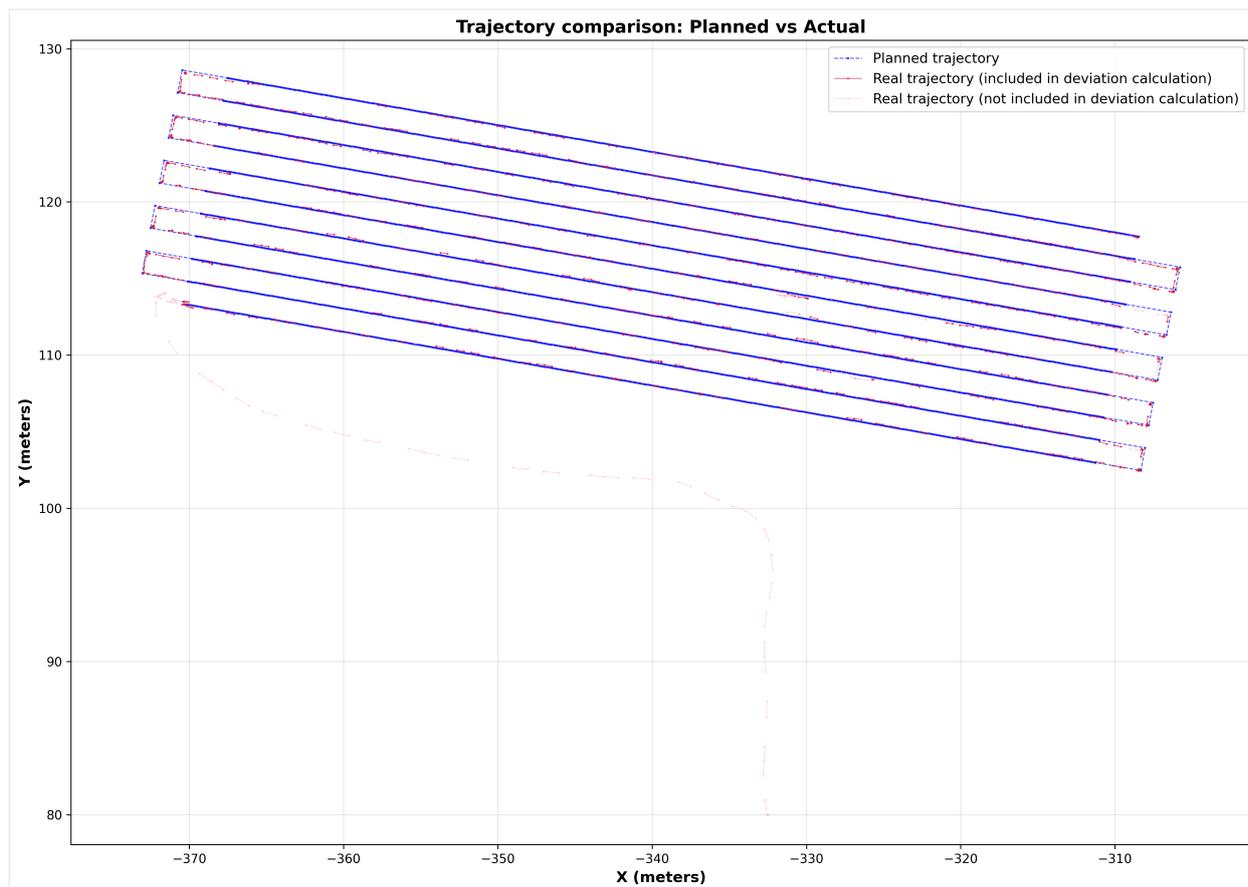


Figure 2.1: Planned vs actual trajectory comparison

Agronomic Summary

Energy per hectare	6.40 kWh/ha
Work rate	0.07 ha/h
Autonomy per battery	0.40 ha/batterie

Time tracking

Tool setup	10 min
GPS connection wait	0 min
Wi-Fi connection wait	0 min
Supervision time	40 min
Travel time	5 min
Restart count	0
Stop count	3
Stop causes	Moteurs force trop; Décalage trajectoire; modification outils, passage de 4 à 2 dents

Work assessment

Quality assessment	Somewhat dissatisfied
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Before work



After work



Performance Indicators

Agronomic ^[1]

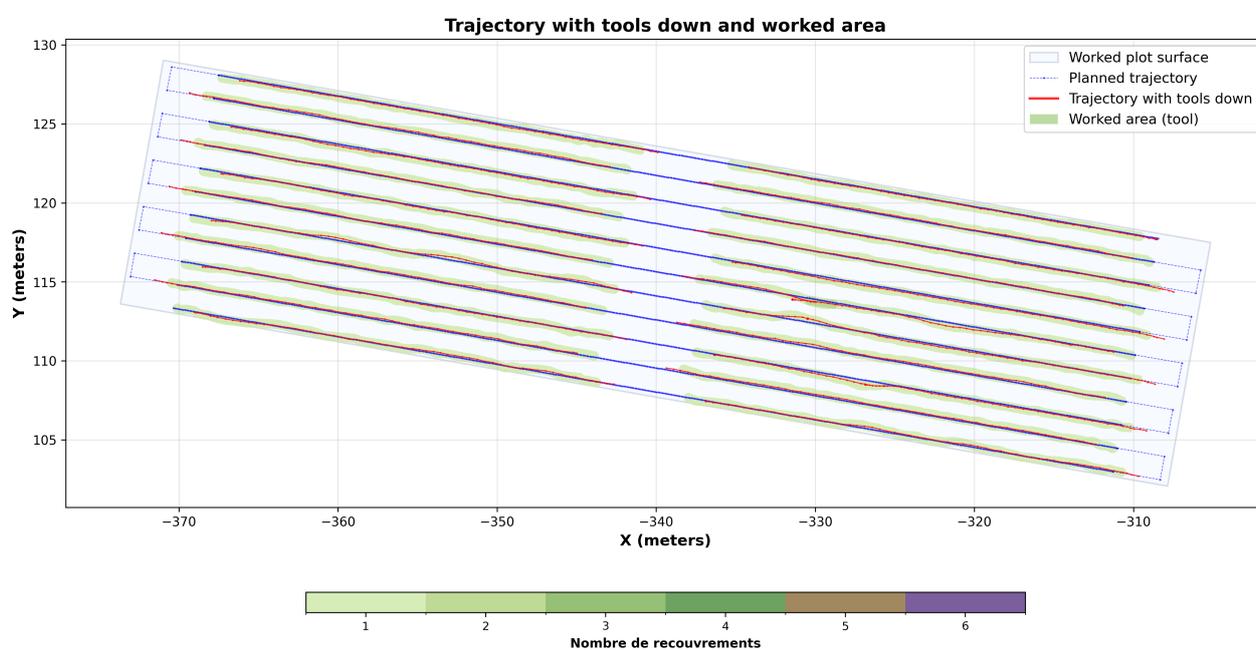
Indicateur	Valeur	Unité
Crop species	Carottes et Radis	
Growth stage	Soil preparation	
Soil texture	Clay loam	
Soil moisture	Friable (optimal)	
Weed pressure	5	%
Planned operation	Soil preparation	
Work quality assessment	Somewhat dissatisfied	
Crop damage	N/A	

Energy ^[2]

Indicateur	Valeur	Unité
SOC at start	69.70	%
SOC at end	57.10	%
Total discharge ^[3] <i>For a battery pack capacity of: 2.54 kWh</i>	13.19	%
Total energy consumed	0.34	kWh
Average power	0.43	kW
Energy per hectare	6.40	kWh/ha
Autonomy per battery <i>Reference battery: 2.54 kWh</i>	0.40	ha/batterie

Work Rate ^[4]

Indicateur	Valeur	Unité
Work rate ^[5]	0.07	ha/h
Area covered ^[6]	0.05	ha
Worked plot surface ^[7]	0.10	ha
Worked area ^[8]	0.04	ha
Effective area ^[9]	0.04	ha
Coverage rate ^[10]	0.29	%
Average speed (km/h)	1.17	km/h
Max speed (km/h)	3.60	km/h



Economic ^[11]

Indicateur	Valeur	Unité
Electricity price	0.19	€/kWh
Labor cost per hour	18.00	€/h
Employees assigned	0	
Labor cost per hectare	0.00	€/ha
Energy cost	0.06	€
Energy cost per hectare	1.22	€/ha
Total cost	0.06	€
Total cost per hectare	1.22	€/ha

Environmental ^[12]

Indicateur	Valeur	Unité
Temperature	17	°C
Precipitation type	None	
CO ₂ emissions ^[13] <i>Emission factor applied: 317 g CO₂ per kWh.</i>	0.11	kg
Plot fragmentation	Consolidated (<0.5 km)	

Mission ^[14]

Indicateur	Valeur	Unité
Planned distance ^[15]	734.76	m
Performed distance ^[16]	819.83	m
Distance deviation	85.06	m
Performed distance (%)	111.58	%
Mean lateral deviation <i>Without half-turn</i>	6.54	cm
Max lateral deviation <i>Without half-turn</i>	19.98	cm
Mean lateral deviation (tool) <i>Without half-turn, tool distance: 110 cm</i>	9.32	cm
Max lateral deviation (tool) <i>Without half-turn, tool distance: 110 cm</i>	19.82	cm
Worked rows ^[17]	11	

Operational ^[18]

Indicateur	Valeur	Unité
Robot weight	280.00	kg
Tool weight	30.00	kg
Total weight	310.00	kg
Energy per kg per hectare	0.02	kWh/kg/ha
Mean torque at work (% of nominal) ^[19] <i>Reference nominal torque: 2.39 N·m — Number of motors: 2.</i>	54.09	%

Safety ^[20]

Indicateur	Valeur	Unité
Geofencing exits	0	

Indicateur	Valeur	Unité
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]

Indicateur	Valeur	Unité
Output errors	0	
Input errors	0	
Battery errors	0	
Motor errors	0	
Cylinder errors	1	
Total errors	1	
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)	0.00	s
Cylinder error time (seconds)	0.10	s
Total error time (seconds)	0.10	s
Error rate per hour	1.24	/h
System availability	100.00	%

Localization ^[22]

Indicateur	Valeur	Unité
Localization errors	0	
Error time (seconds)	0.00	s
Error time (hours)	0.00	h

Time ^[23]

Indicateur	Valeur	Unité
Total duration	2898.09	s
Total duration (hours)	0.81	h
Active time	1924.89	s

Indicateur	Valeur	Unité
Active time (hours)	0.53	h
Inactive time	973.20	s
Inactive time (hours)	0.27	h
Active time (%)	66.42	%
Inactive time (%)	33.58	%

Mission 3

Trial date	2026-03-18
Location	SABI AGRI, Auvergne, France
Operator	Nicolas
Start time	16:30
End time	17:31

Weather

Precipitation type	None
Temperature	17 °C
Sun position	Zenith

Terrain

Slope	0 %
Cross slope	0 %

Soil

Texture	Clay loam
Dominant particle size	Stones 20-200 mm
Moisture condition	Friable (optimal)

Crop

Species	Carottes et Radis
Growth stage	Bare soil
Weed pressure	5 %
Planned operation	Scraping

Adjacent environment

Tall vegetation	No
Tall buildings	No
Metallic structures	Yes
Ditch or embankment	Yes
High voltage lines	No
Roads	No
No network zone	No

Robot configuration

Robot weight	280 kg
Robot width	0.64 m

Tool

Tool name	Herse etri
Tool type	Trailed
Tool weight	15 kg
Tool length	0.8 m
Tool width	0.6 m
Tool height	0.6 m
Tool total length	1.1 m
Working depth	0.05 m



Figure 3.1: Mission presentation photo

Mission presentation

Mission parameters

Task to perform	Préparation du sol
Trajectory	Rectiligne, square turn
Working speed	3.6 km/h
Mission file	herse_1_2.json

Organization

Workforce

Total number of employees	1
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Surface

Theoretical surface of the plot	0.08 ha
Worked plot surface	0.1047 ha
Plot fragmentation	Consolidated (<0.5 km)

Trajectory

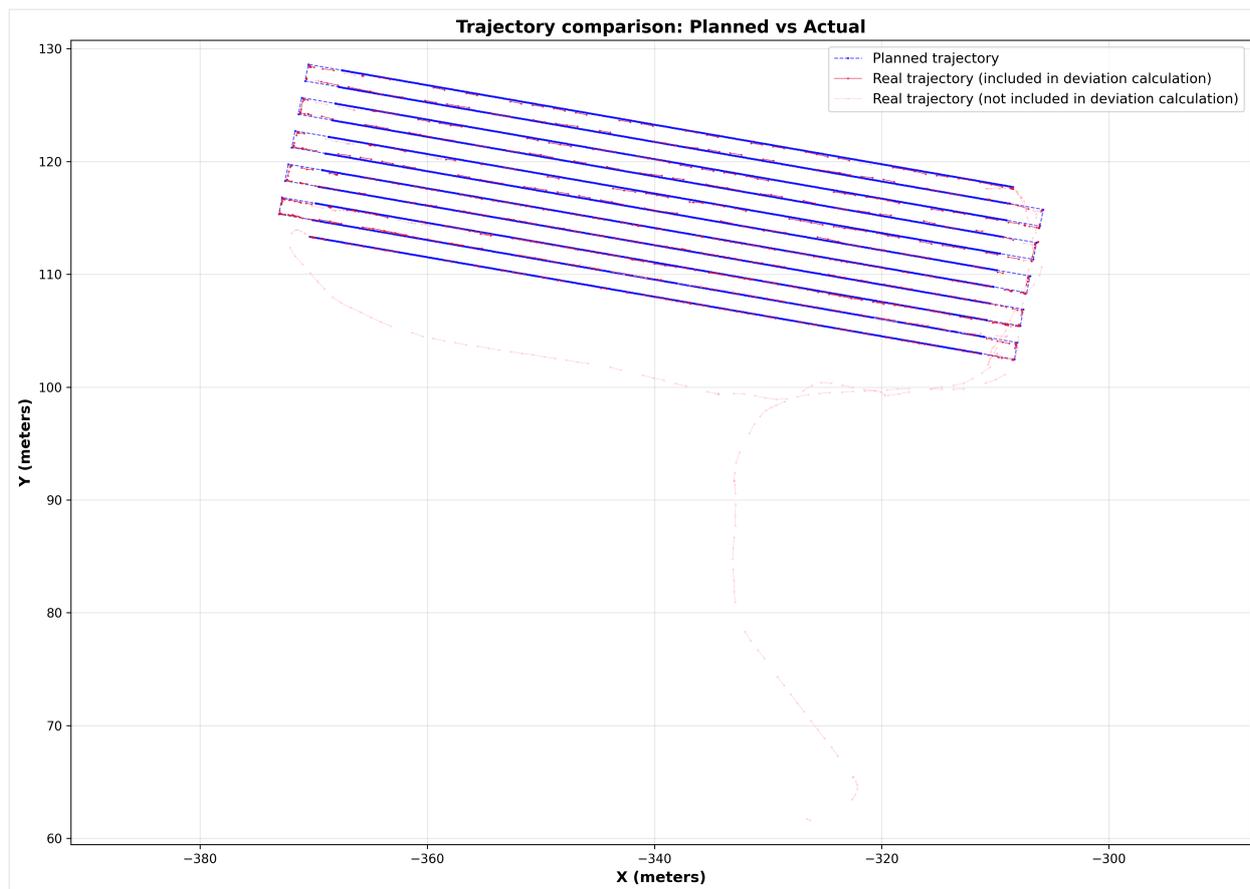


Figure 3.1: Planned vs actual trajectory comparison

Agronomic Summary

Energy per hectare	5.12 kWh/ha
Work rate	0.07 ha/h
Autonomy per battery	0.50 ha/batterie

Time tracking

Tool setup	2 min
GPS connection wait	0 min
Wi-Fi connection wait	0 min
Supervision time	30 min
Travel time	5 min
Restart count	0
Stop count	6
Stop causes	Sortie de traj (vitesse très élevée)

Work assessment

Quality assessment	Generally satisfied
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Crop damage

None

Before work



After work



Performance Indicators

Agronomic ^[1]

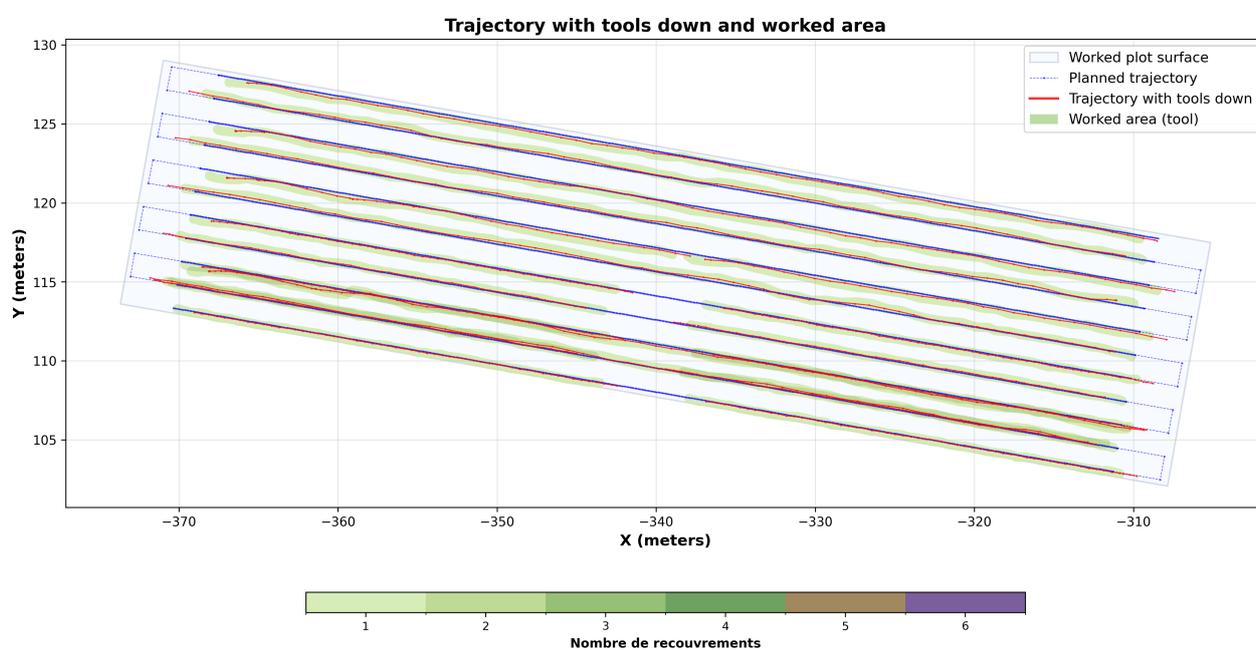
Indicateur	Valeur	Unité
Crop species	Carottes et Radis	
Growth stage	Bare soil	
Soil texture	Clay loam	
Soil moisture	Friable (optimal)	
Weed pressure	5	%
Planned operation	Scraping	
Work quality assessment	Generally satisfied	
Crop damage	None	

Energy ^[2]

Indicateur	Valeur	Unité
SOC at start	57.10	%
SOC at end	58.80	%
Total discharge ^[3] <i>For a battery pack capacity of: 2.54 kWh</i>	13.57	%
Total energy consumed	0.35	kWh
Average power	0.53	kW
Energy per hectare	5.12	kWh/ha
Autonomy per battery <i>Reference battery: 2.54 kWh</i>	0.50	ha/batterie

Work Rate ^[4]

Indicateur	Valeur	Unité
Work rate ^[5]	0.07	ha/h
Area covered ^[6]	0.07	ha
Worked plot surface ^[7]	0.10	ha
Worked area ^[8]	0.05	ha
Effective area ^[9]	0.04	ha
Coverage rate ^[10]	13.32	%
Average speed (km/h)	1.70	km/h
Max speed (km/h)	3.60	km/h



Economic ^[11]

Indicateur	Valeur	Unité
Electricity price	0.19	€/kWh
Labor cost per hour	18.00	€/h
Employees assigned	0	
Labor cost per hectare	0.00	€/ha
Energy cost	0.07	€
Energy cost per hectare	0.97	€/ha
Total cost	0.07	€
Total cost per hectare	0.97	€/ha

Environmental ^[12]

Indicateur	Valeur	Unité
Temperature	17	°C
Precipitation type	None	
CO ₂ emissions ^[13] <i>Emission factor applied: 317 g CO₂ per kWh.</i>	0.11	kg
Plot fragmentation	Consolidated (<0.5 km)	

Mission ^[14]

Indicateur	Valeur	Unité
Planned distance ^[15]	734.76	m
Performed distance ^[16]	1054.41	m
Distance deviation	319.64	m
Performed distance (%)	143.50	%
Mean lateral deviation <i>Without half-turn</i>	7.60	cm
Max lateral deviation <i>Without half-turn</i>	19.95	cm
Mean lateral deviation (tool) <i>Without half-turn, tool distance: 110 cm</i>	8.75	cm
Max lateral deviation (tool) <i>Without half-turn, tool distance: 110 cm</i>	19.92	cm
Worked rows ^[17]	11	

Operational ^[18]

Indicateur	Valeur	Unité
Robot weight	280.00	kg
Tool weight	15.00	kg
Total weight	295.00	kg
Energy per kg per hectare	0.02	kWh/kg/ha
Mean torque at work (% of nominal) ^[19] <i>Reference nominal torque: 2.39 N·m — Number of motors: 2.</i>	50.79	%

Safety ^[20]

Indicateur	Valeur	Unité
Geofencing exits	0	

Indicateur	Valeur	Unité
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]

Indicateur	Valeur	Unité
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)	51.20	s
Cylinder error time (seconds)	51.34	s
Total error time (seconds)	52.04	s
Error rate per hour	2.06	/h
System availability	98.51	%

Localization ^[22]

Indicateur	Valeur	Unité
Localization errors	5	
Error time (seconds)	1327.41	s
Error time (hours)	0.37	h

Time ^[23]

Indicateur	Valeur	Unité
Total duration	3493.07	s
Total duration (hours)	0.97	h
Active time	1722.61	s

Indicateur	Valeur	Unité
Active time (hours)	0.48	h
Inactive time	1770.46	s
Inactive time (hours)	0.49	h
Active time (%)	49.32	%
Inactive time (%)	50.68	%

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] CO₂ 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.