ÉCOPHYTO
ZNA RÉDUIRE ET AMÉLIORER L'UTILISATION DES PHYTOS

CompamedZNA

COMPARISON OF WEED CONTROL METHODS USED TO MANAGE NON-CROP AREAS

The Project

⇨ 4 years (2010-2014)

Scope of the study: curative weed management practices

⇨ Weed management practices and their costs in non-crop areas
⇨ Experimental assessment of weed control methods
⇨ Environmental assessment (LCA) of weed control methods

Project outputs

⇨ Summary document
⇨ Self assessment tool of weed management practices

Project Leaders

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Funding Organisations

Ministère de l'Agriculture de l'Agroalimentaire et de la Forêt
Ministère de l'Écologie du Développement durable et de l'Énergie
ONEMA – Office national de l'eau et des milieux aquatiques
Val'hor – Les professionnels du végétal
UPJ – Union des entreprises pour la protection des jardins et des espaces publics
ADEME – Agence de l'Environnement et de la Maîtrise de l'Énergie
ASFA – Autoroutes & Ouvrages concédés
AAPP

Project Partners

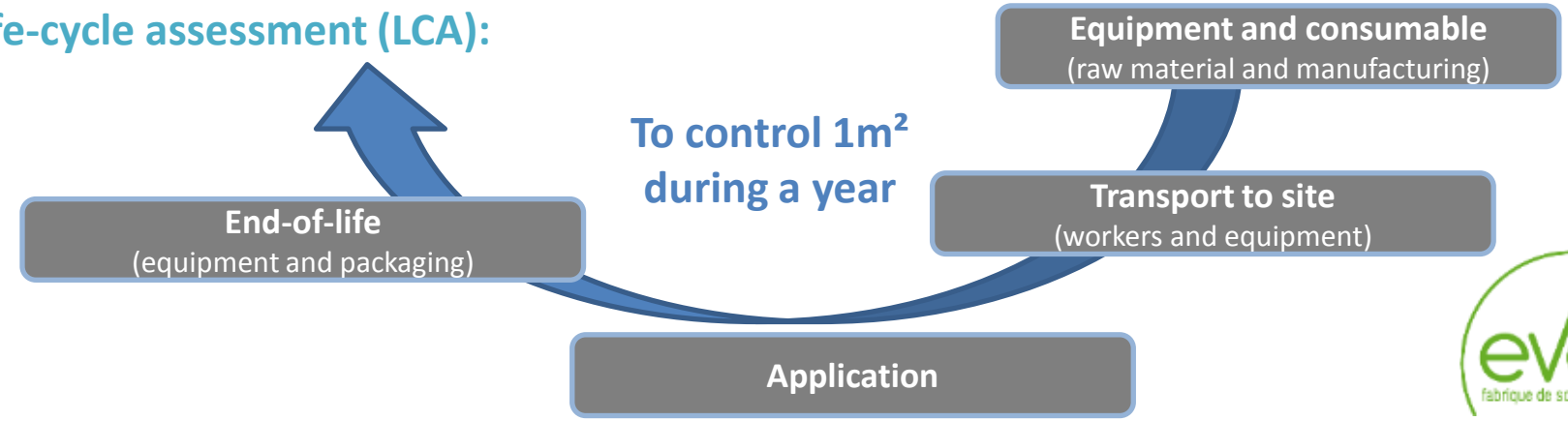
AITF – Association des Ingénieurs Territoriaux de France
Hortis – Les responsables d'espaces nature en ville
AFPP
Mairie de Paris
Versailles

ENVIRONMENTAL ASSESSMENT OF WEED CONTROL METHODS

➔ Methods:

CHEMICAL	FLAME	HOT WATER & STEAM	MECHANICAL
Backpack sprayer	One torch + backpack	Hot water (electric)	Trailed weed brush
Optical detection sprayer	One torch + trolley	Hot water (gasoil)	Brush + self-propelled trolley
Trailed sprayer	> 3 torches + trolley	Steam < 100 l (electric)	Hand weeding, hoe
	Infrared + trolley	Steam < 100 l (gasoil)	
		Steam > 100 l (gasoil)	

➔ Life-cycle assessment (LCA):



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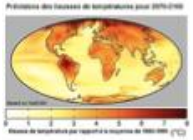
LCA OF WEED CONTROL METHODS

➔ Impact indicators:

Energy consumption (non renewable)

Water consumption



Climate change *(potential)*

Photochemical Ozone Creation *(potential)*

Eutrophisation *(potential)*

Aquatic ecotoxicity *(potential)*

Ozone (layer) depletion *(potential)*

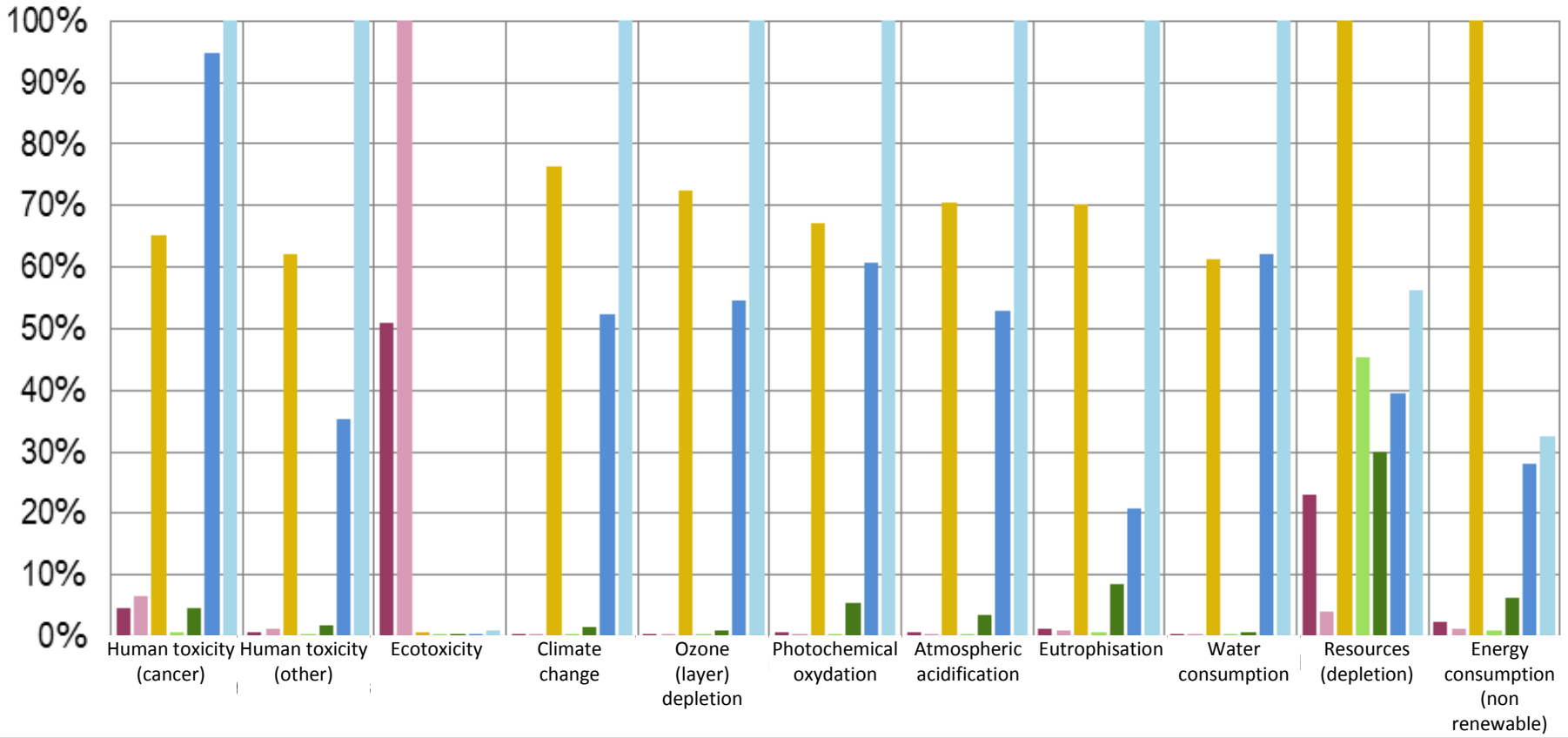
Resources (depletion) *(potential)*

Acidification *(potential)*

Human toxicity *(potential)*

LCA OF WEED CONTROL METHODS

Impermeable surface – Least severe control



Optical detection sprayer	Backpack sprayer	One torch + trolley then Hot water	Hoe	Trailed weed brush	Steam	Hot water

LCA OF WEED CONTROL METHODS

➔ Interpretation :

- Hoe is the method with the lowest impact.

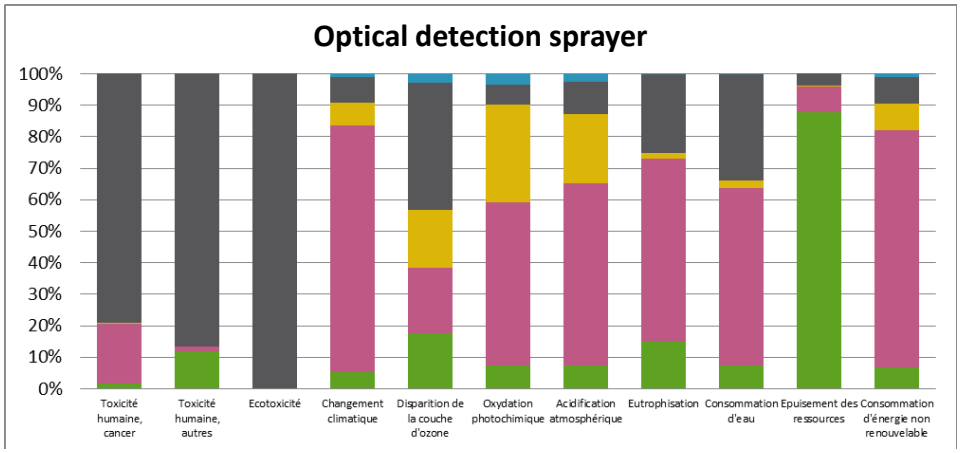
- Chemical methods have the highest impact on 'aquatic ecotoxicity'.
- Using optical detection sprayer rather than other chemical methods limits environmental impact

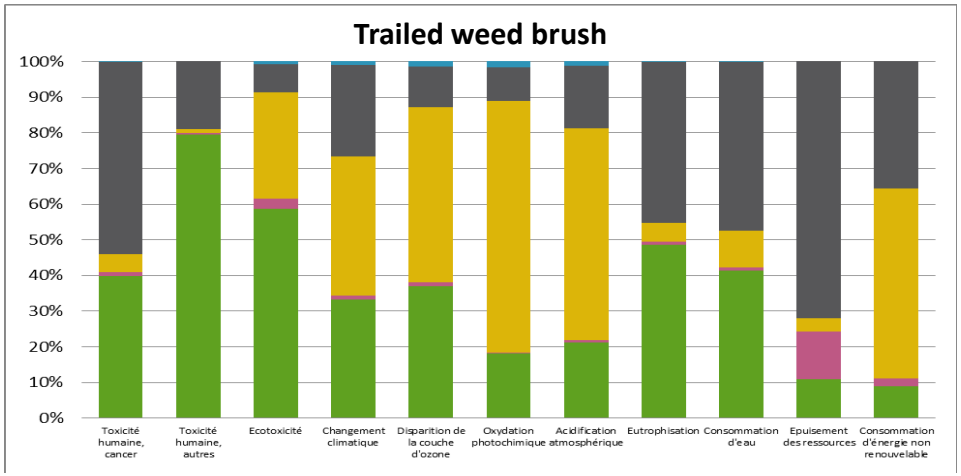
- Hot Water, Steam and Flame methods have the highest impact on all of environmental indicators , except on 'aquatic ecotoxicity'.
- Overall, Hot Water has the highest negative impact of all the methods studied, especially on impermeable surface.

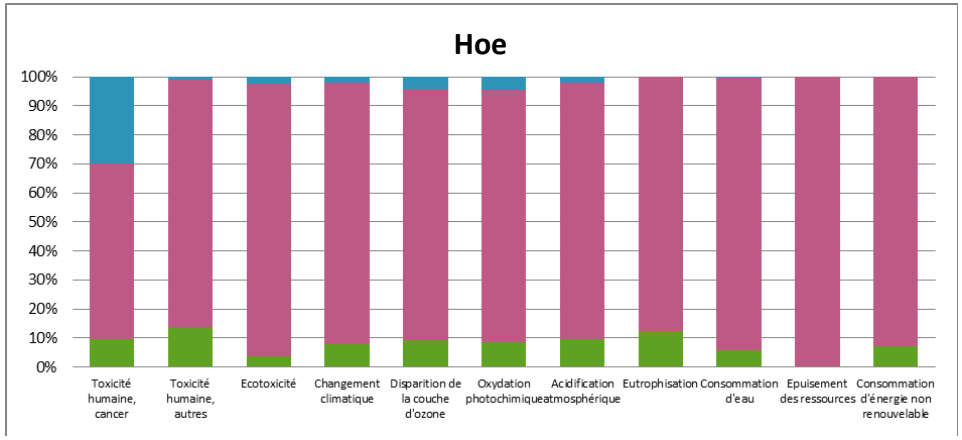
- Overall, mechanical methods (Brush and Rotay Harrow) have low impact.
- Nevertheless, there is a significant impact of Brush on 'resources' due to wear on metallic strands.

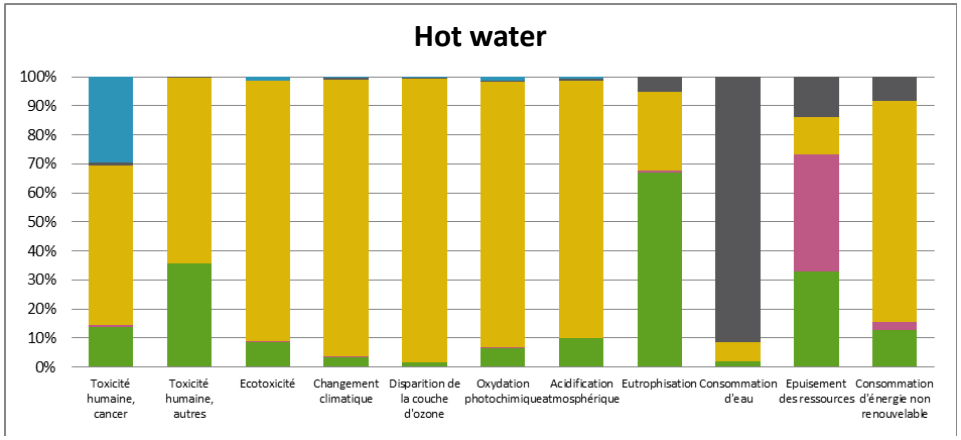
LCA OF WEED CONTROL METHODS

ANALYSIS OF THE CONTRIBUTION









Use of the equipment / **Wear on PPE** /
Fuel consumption during weed control / **Use of consumables during weed contol** /
Transport to site

LCA OF WEED CONTROL METHODS

➔ **Interpretation :**

- Use of the equipment is most of the time the major contributor (chemical products, water, gas, diesel, brush).

- Wear on PPE can contribute significantly to the impact (for example for Hoe).

- Equipment (manufacturing and delivery) contribute significantly to the impact (at least 10% of the total impact).

- Transport to site (10 km round trip) contributes little to the environmental impact of weed control given the average size of the controlled sites

LCA OF WEED CONTROL METHODS

➔ Conclusion:

The environmental issues are very different by nature for chemical vs alternative methods :

- Local impacts (ecotoxicity) vs. overall impacts (resources, GHG, …)

The two parameters « yield » and « number of rounds » are the most sensible parameters.

The best way to reduce the environmental impact of weed control in non-crop areas is to weed less often :

- Weeds tolerance by public (and so decision makers).
- No weed control into some specific area
- Transition from a systematic control to a moderate and sustainable weed control.

→ Factsheets

→ Self assessment tool

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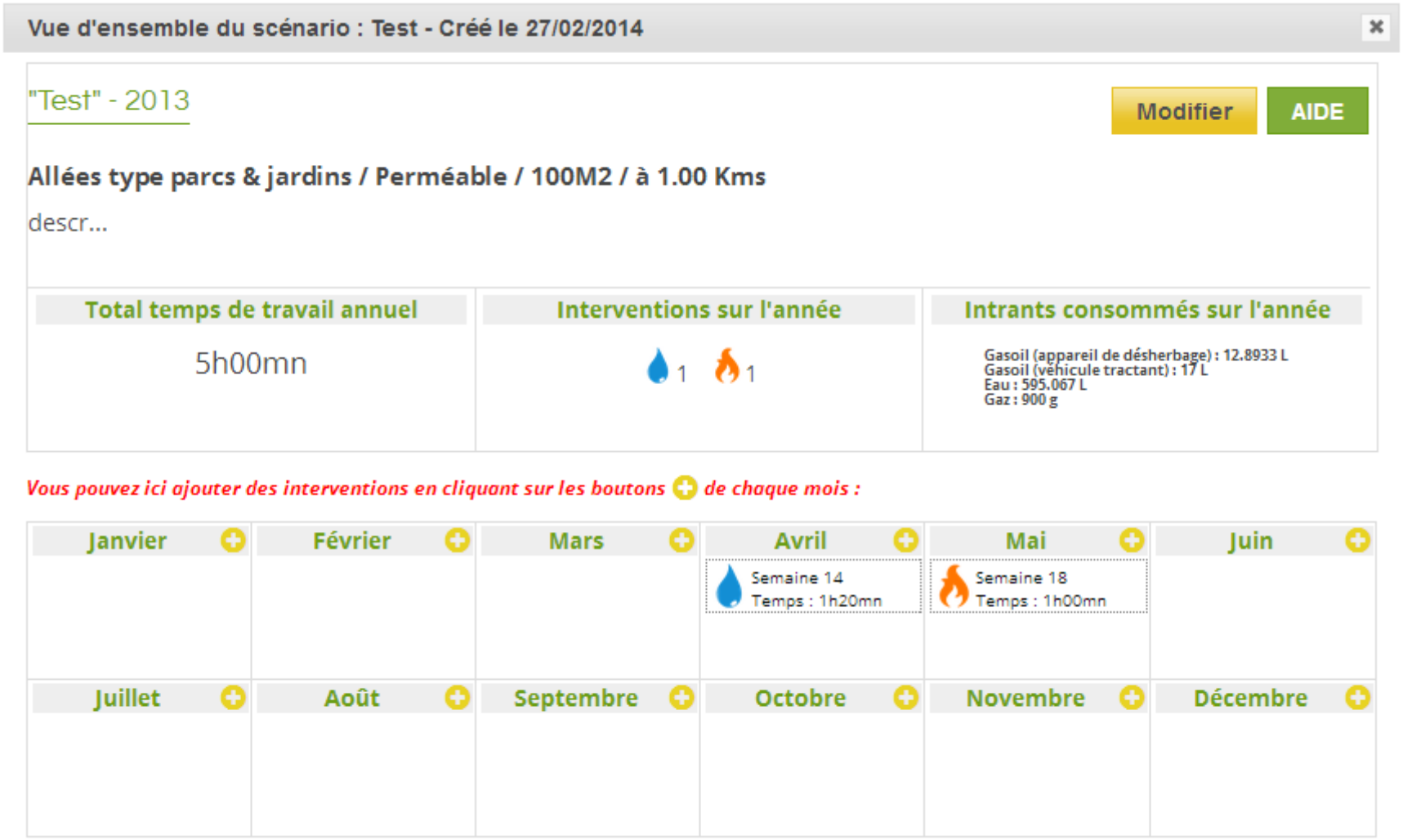
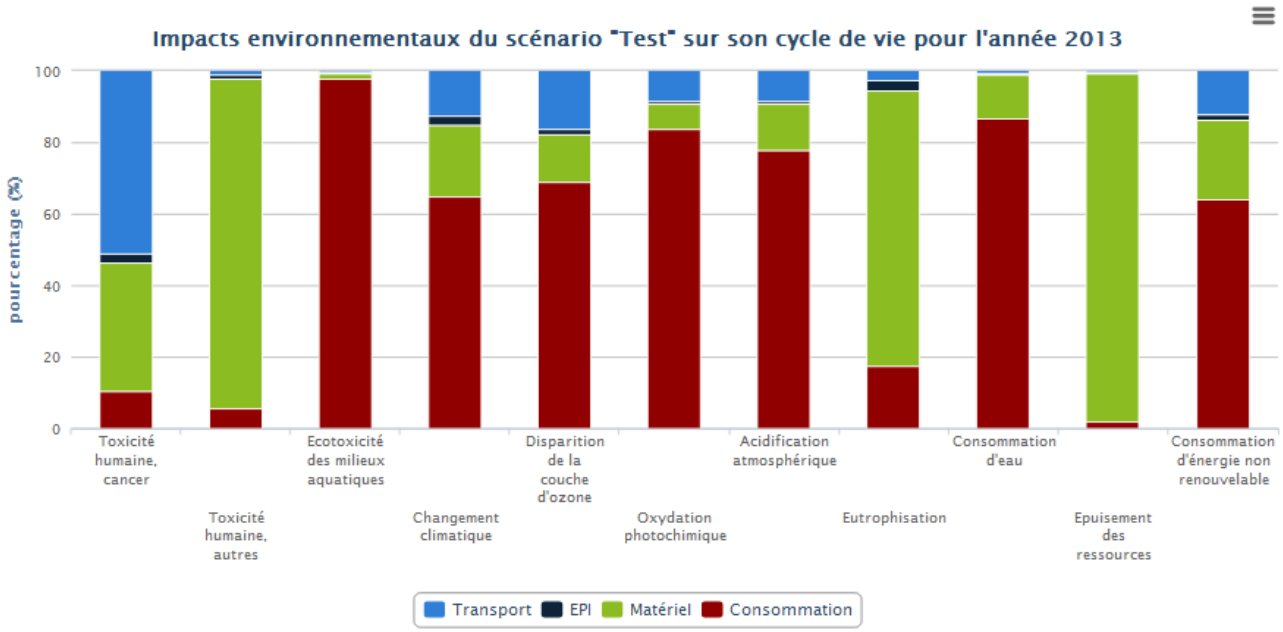
SELF ASSESSMENT TOOL

- ➔ **To build** your own scenarios
- ➔ **To assess** your own scenarios or hypothetical examples
- ➔ **To compare** your own scenarios or hypothetical examples

SELF ASSESSMENT TOOL – BUILDING A WEED CONTROL SCENARIO



SELF ASSESSMENT TOOL – CALCULATION OF POTENTIAL ENVIRONMENTAL IMPACTS

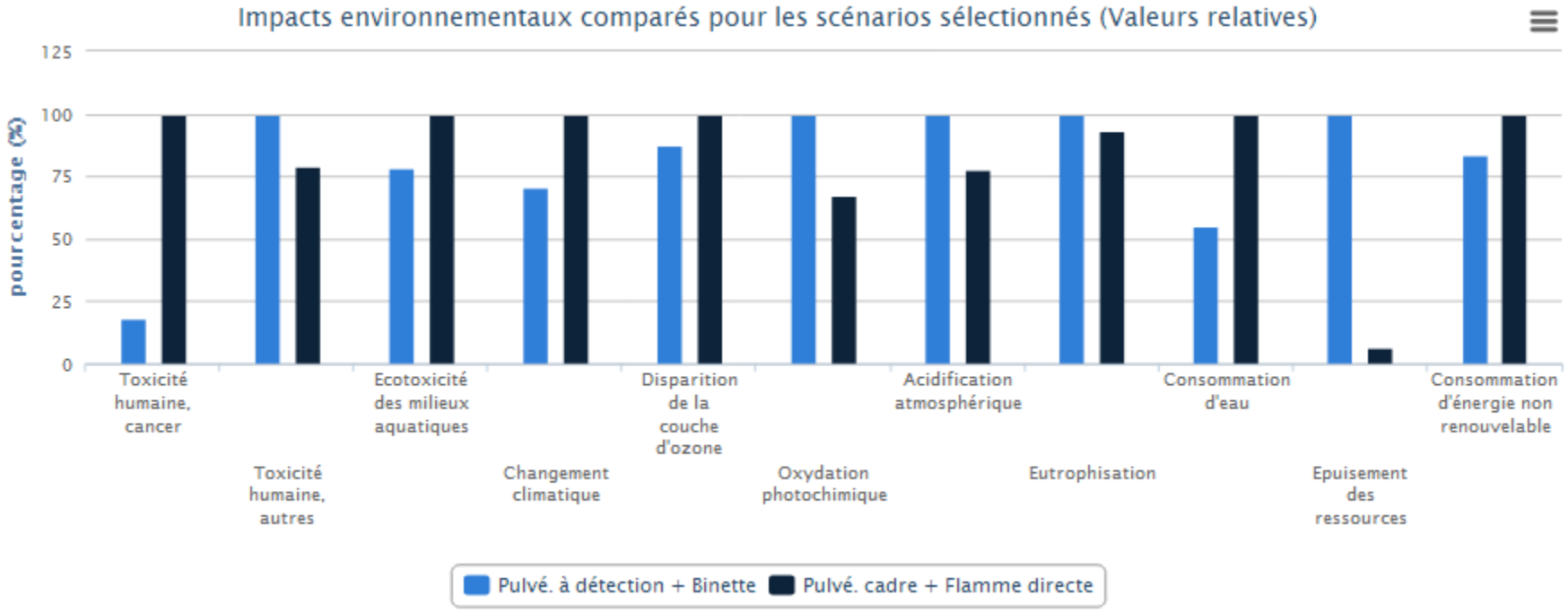


Valeurs d'impact calculées pour le scénario Test sur son cycle de vie pour l'année 2013

Indicateurs	Transport	EPI	Matériel	Consommation
Toxicité humaine, cancer (CTUh)	3.54e-9	1.56e-10	2.49e-9	7.21e-10
Toxicité humaine, autres (CTUh)	2.43e-10	2.08e-10	2.02e-8	1.20e-9
Ecotoxicité des milieux aquatiques (CTUe)	2.74e-2	2.06e-2	9.60e-2	5.99e+0
Changement climatique (kg CO2 eq)	1.62e+1	3.09e+0	2.56e+1	8.27e+1
Disparition de la couche d'ozone (kg CFC eq)	2.40e-6	1.92e-7	1.96e-6	1.02e-5
Oxydation photochimique (kg NMVOC)	1.06e-1	5.96e-3	8.61e-2	1.03e+0
Acidification atmosphérique (molC H+ eq)	8.74e-2	8.49e-3	1.38e-1	8.12e-1
Eutrophisation (kg P eq)	6.43e-4	7.04e-4	1.92e-2	4.35e-3
Consommation d'eau (m3)	2.68e-3	2.31e-3	4.82e-2	3.47e-1
Epuisement des ressources (kg Sb eq)	7.70e-6	1.18e-5	2.56e-3	4.66e-5
Consommation d'énergie non renouvelable (éq MJ)	2.33e+2	3.23e+1	4.26e+2	1.23e+3

Notation scientifique : 1.00e+3 = 1.00×10^{3} = 1000 ; 1.00e-3 = 1.00^{-3} = 0.001

SELF ASSESSMENT TOOL – COMPARISON OF ENVIRONMENTAL IMPACTS



Valeurs d'impact calculées pour les scénarios sélectionnés

Indicateurs \ Scénarios	Pulvé. à détection + Binette	Pulvé. cadre + Flamme directe
Toxicité humaine, cancer (CTUh)	7.90e-10	4.36e-9
Toxicité humaine, autres (CTUh)	2.69e-9	2.13e-9
Ecotoxicité des milieux aquatiques (CTUe)	9.76e+0	1.24e+1
Changement climatique (kg CO2 eq)	2.56e+1	3.61e+1
Disparition de la couche d'ozone (kg CFC eq)	3.19e-6	3.63e-6
Oxydation photochimique (kg NMVOC)	2.33e-1	1.57e-1
Acidification atmosphérique (molC H+ eq)	1.94e-1	1.51e-1
Eutrophisation (kg P eq)	5.10e-3	4.75e-3
Consommation d'eau (m3)	9.24e-3	1.68e-2
Epuisement des ressources (kg Sb eq)	4.26e-4	2.83e-5
Consommation d'énergie non renouvelable (éq MJ)	3.68e+2	4.41e+2

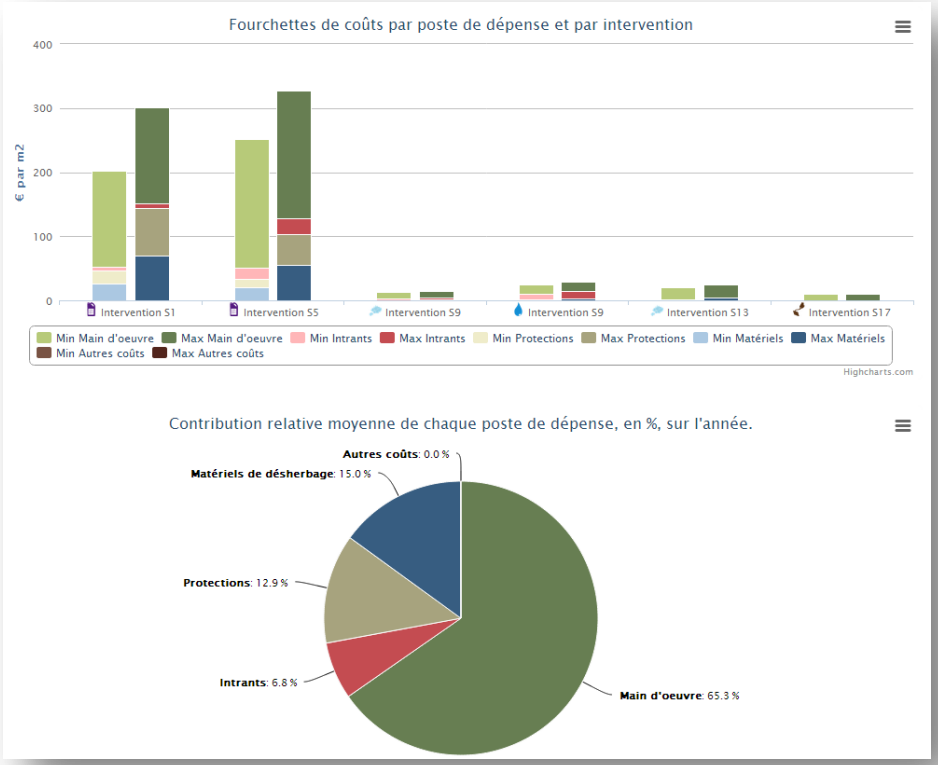
Notation scientifique : 1.00e+3 = $1.00x10^3$ = 1000 ; 1.00e-3 = 1.00^{-3} = 0.001

SELF ASSESSMENT TOOL – COST ASSESSMENT

➔ To build a weed control scenario

➔ To quantify expenditures

➔ To calculate total cost of the scenario



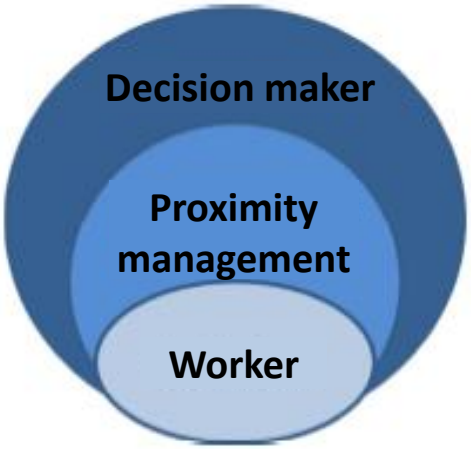
Risk assessment of weed control methods on workers health

WEED CONTROL
STUDY OF RISKS AND WORK ORGANISATION
RECOMMENDATIONS

A MULTIDISCIPLINARY APPROACH

3 levels investigated

Work planning



3rd level

2nd level

Ergonomics

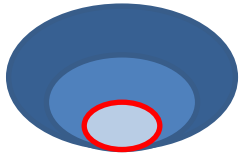
1st level

Health

Risks, levels of exposure, safety

Working group « decision makers »

HEALTH AND SAFETY Deliverables



An appendix for each risk factor (noise, vibrations, …)

✓ Definition, health impacts, statutory limits, methods, results, recommendations

A factsheet on 'noise, vibrations, dust, exhaust gas'

✓ General recommandations for when you are exposed to those risk factors (non exhaustive)

A factsheet for each weed control method

✓ Hazardous conditions and recommendations (non exhaustive)

Those documents could be used to :

- Help to draw up the 'professionnal risk assessment document',
- Take prevention measures,
- Choose a new equipment.

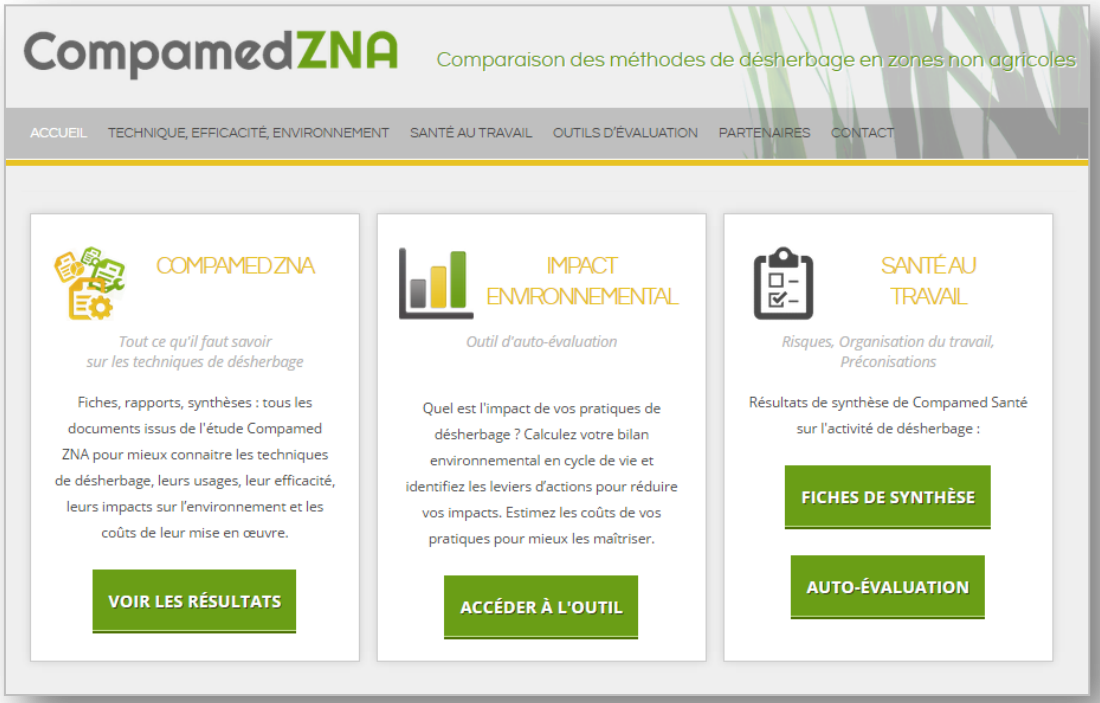
ERGONOMICS

Deliverables

- 3 factsheets about work planning :
  - Creation and allocation of work orders
  - Team scheduling
  - Communication

- A web application : [Weed control management and occupational health]

A WEBSITE www.compamed.fr



Reports, reviews

Factsheets

Toolkit

THANK YOU FOR YOUR ATTENTION

WEBSITE AND SELF ASSESSMENT TOOLS

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