



THE MULCHING CASE: HOW TO IMPROVE COLLECTION AND RECOVERY ?

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AGRICULTEURS, DISTRIBUTEURS, INDUSTRIELS POUR LA VALORISATION DES DECHETS AGRICOLES

MULCHING FILM

AF: Agricultural Film
(non-contamination)



Agricultural fields

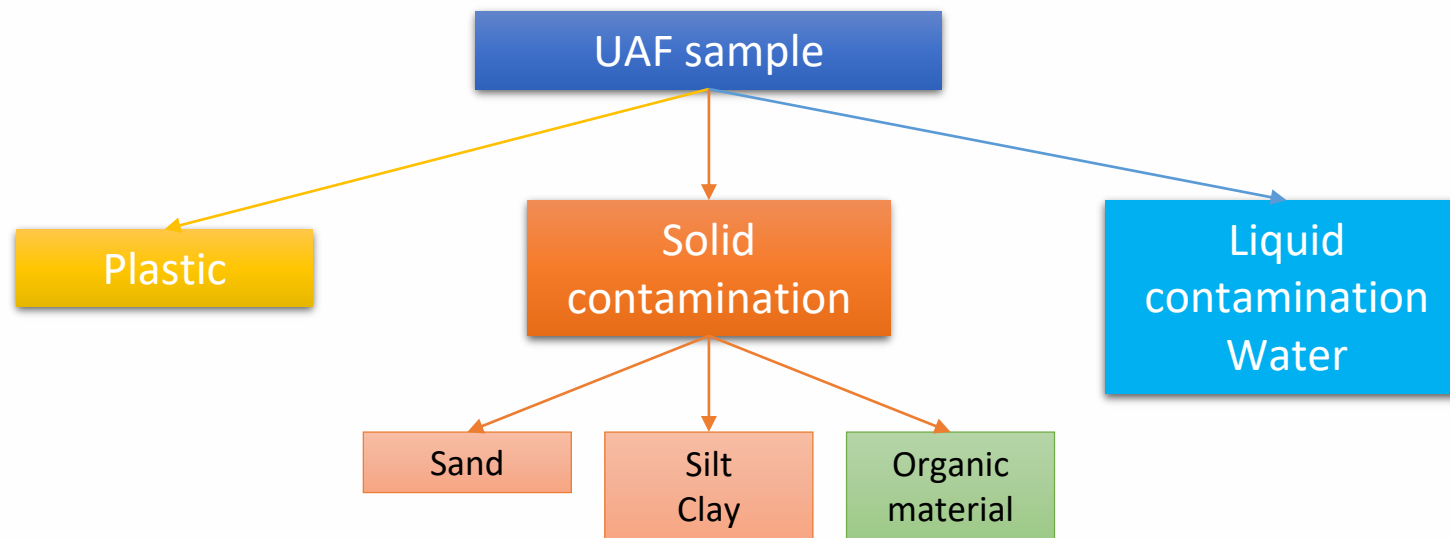


UAF : Used Agricultural Film
(Plastic + contamination)



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❖ Composition of the used agricultural film (UAF).



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DEFINITIONS

- ❖ Contamination rate:

$$CR = \frac{\text{UAF Weight} - \text{AF Weight}}{\text{UAF Weight}}$$

- ❖ Contamination coefficient:

$$CC = \frac{\text{UAF Weight}}{\text{AF Weight}}$$

AF: Agricultural Film
(non-contamination)

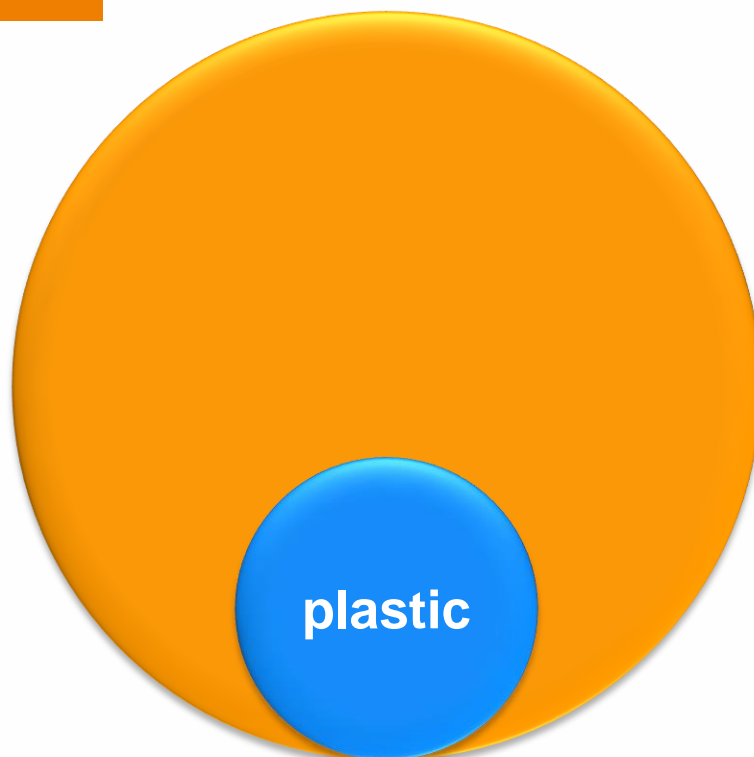
UAF : Used Agricultural Film
(Plastic + contamination)

- ❖ Thus:

$$CC = \frac{1}{1 - CR} \quad \text{et} \quad CR = 1 - \frac{1}{CC}$$

CONTEXT: IMPACT OF CONTAMINATION

CR: 70%



CC: 3.3

300 kg/ha new film (AF)
1000 kg/ha used film (UAF)
700 kg of contaminants

CR: 40%

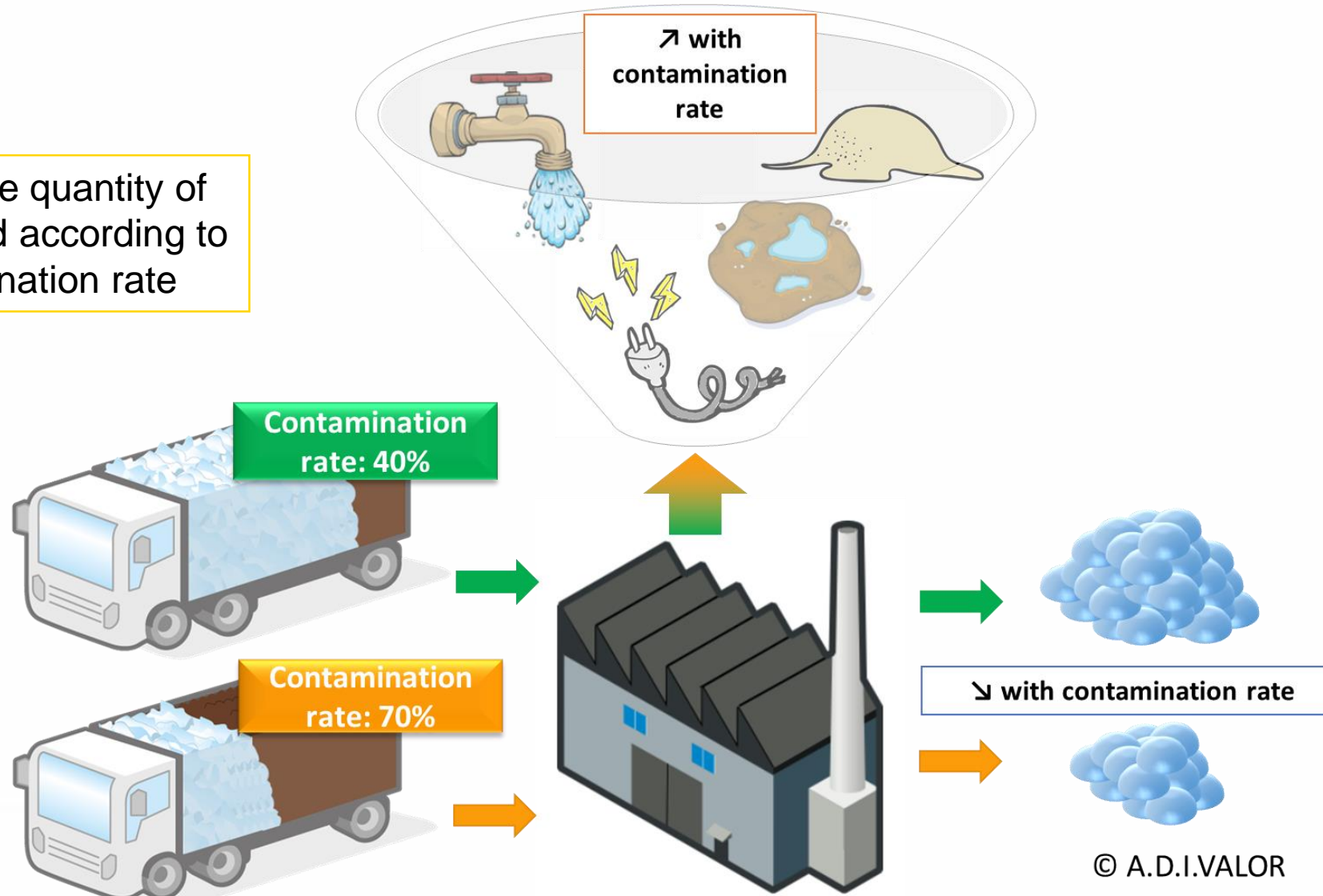


CC: 1.7

300 kg/ha new film (AF)
510 kg/ha used film (UAF)
210 kg of contaminants

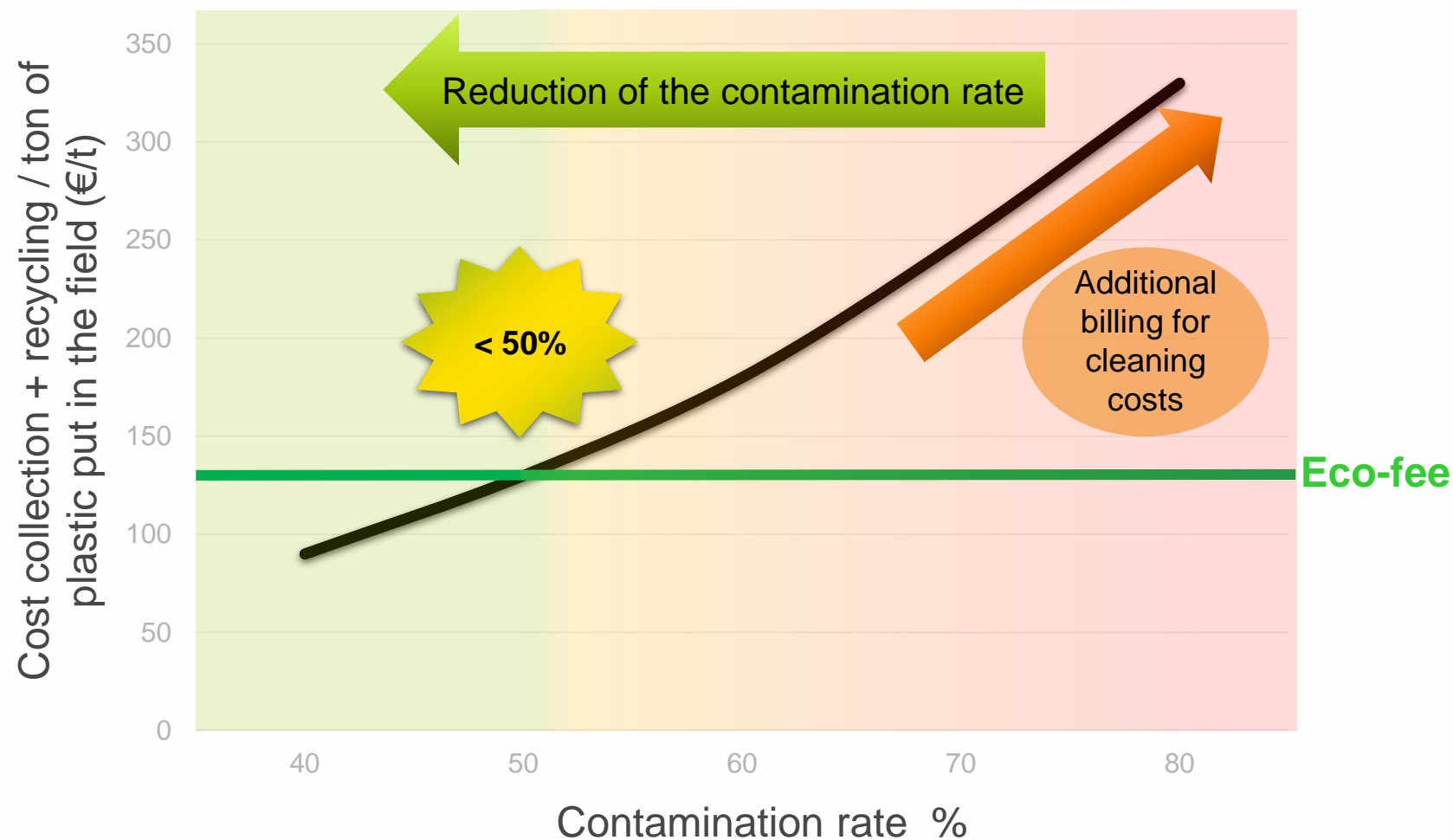
REDUCING CONTAMINATION – REDUCING COST

Diagram of the quantity of plastic recycled according to the contamination rate



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REDUCING CONTAMINATION – REDUCING COST



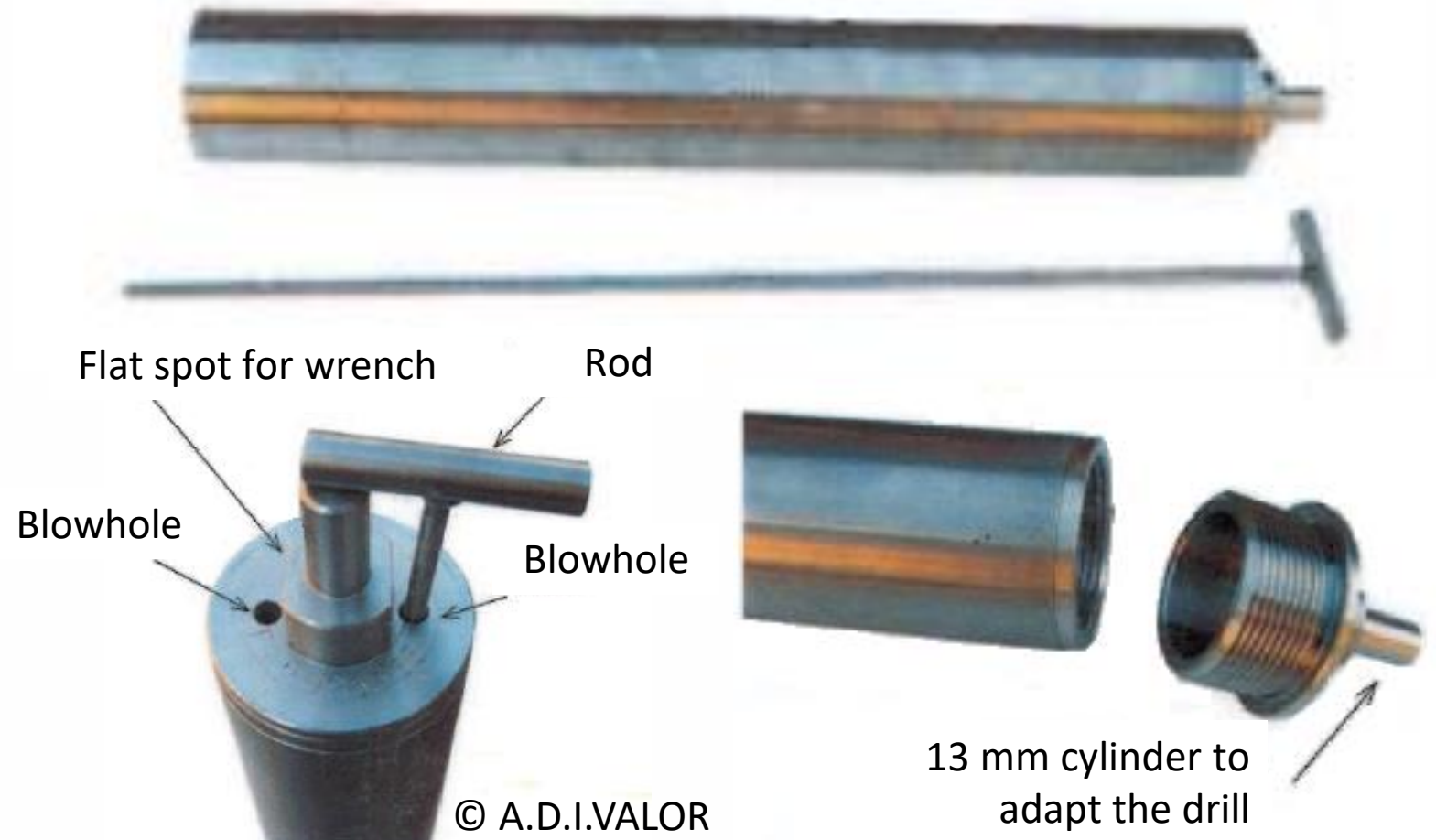
“RAFU” INNOVATION: SAMPLING AND MEASUREMENT

- ❖ Development of a method for sampling and measurement of contamination.



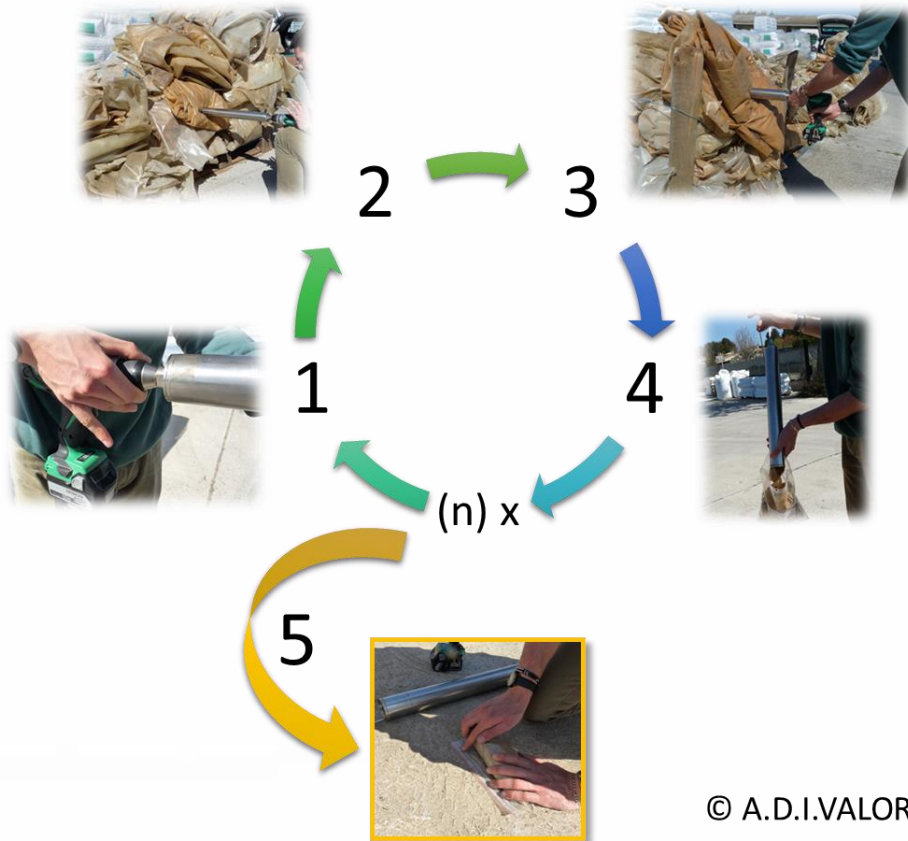
SAMPLING AND MEASUREMENT

- ❖ Drill core used for UAF samples:



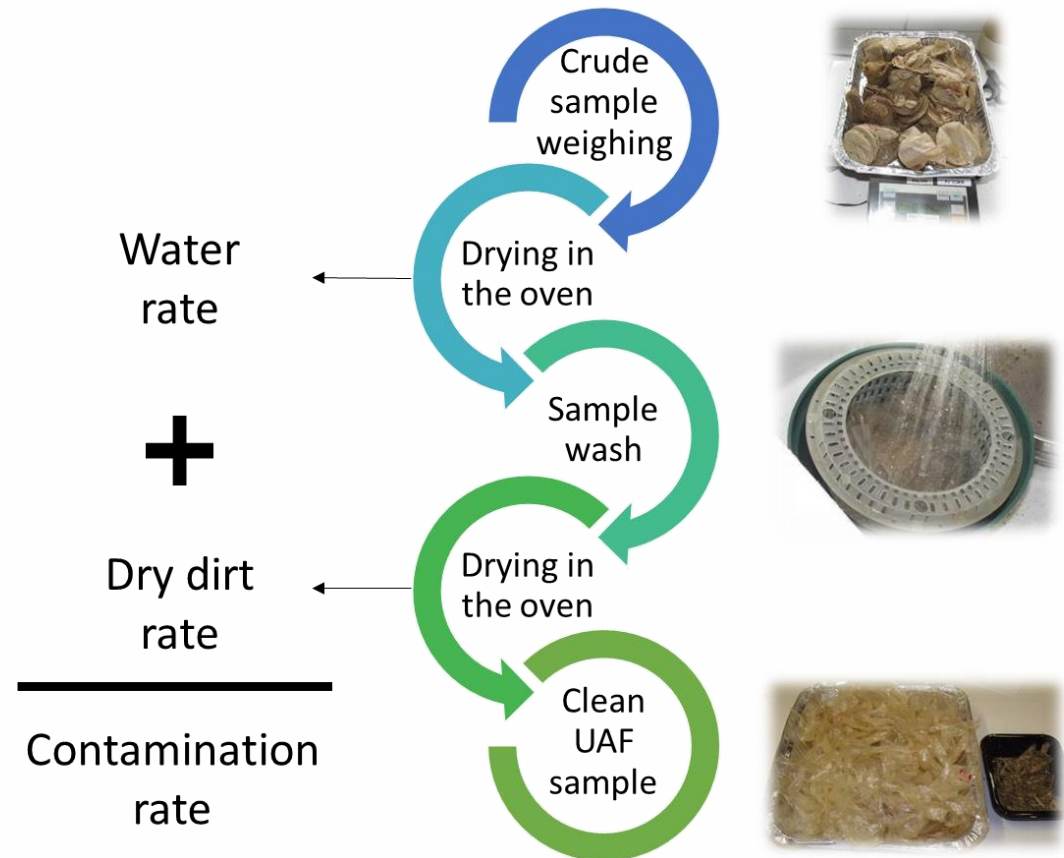
SAMPLING AND MEASUREMENT

❖ UAF sampling protocol:



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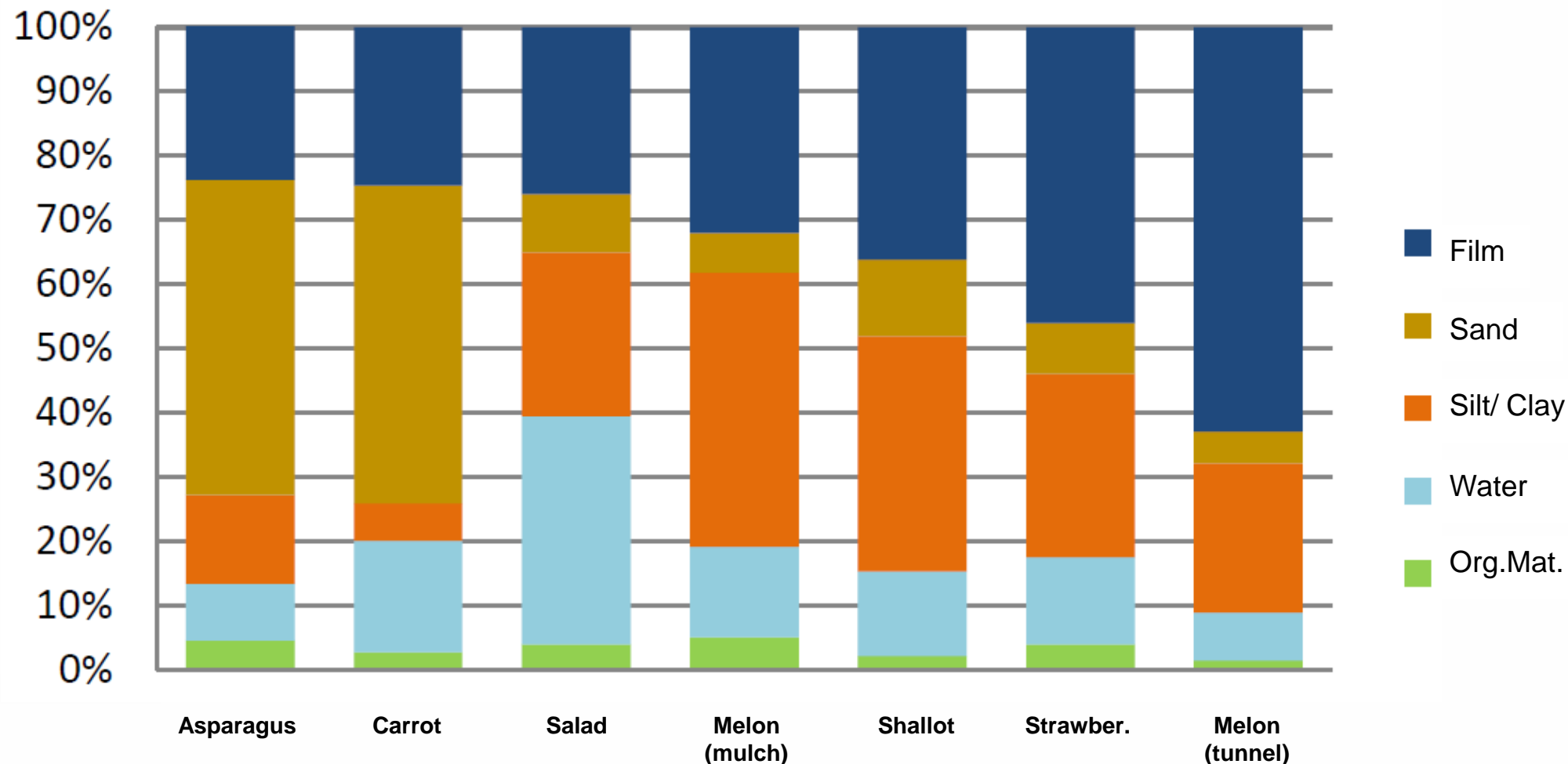
❖ Analytical protocol of UAF samples:



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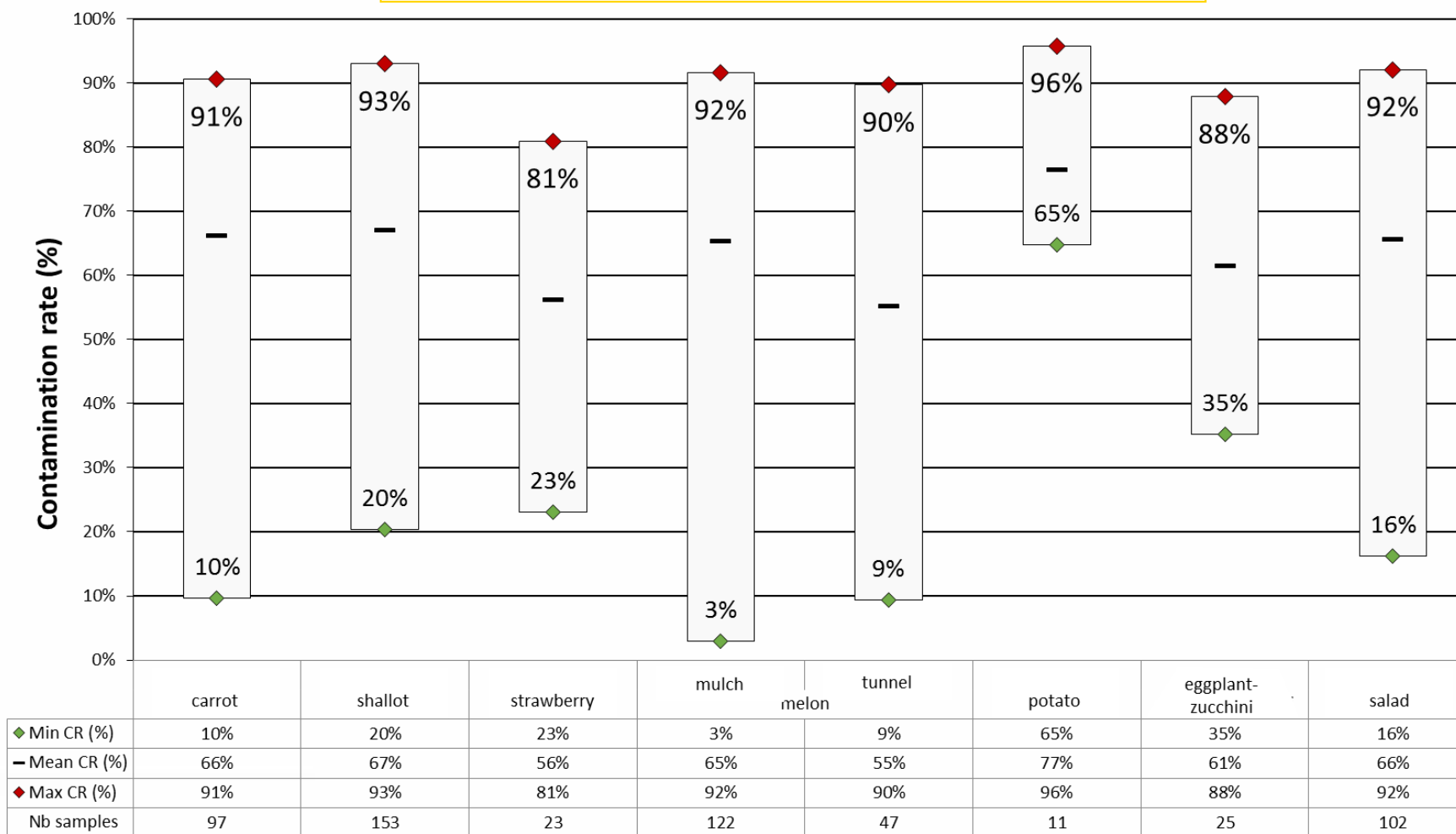
RESULTS: WASTE CHARACTERIZATION

USED AGRICULTURAL FILM CHARACTERIZATION BY CROP TYPE



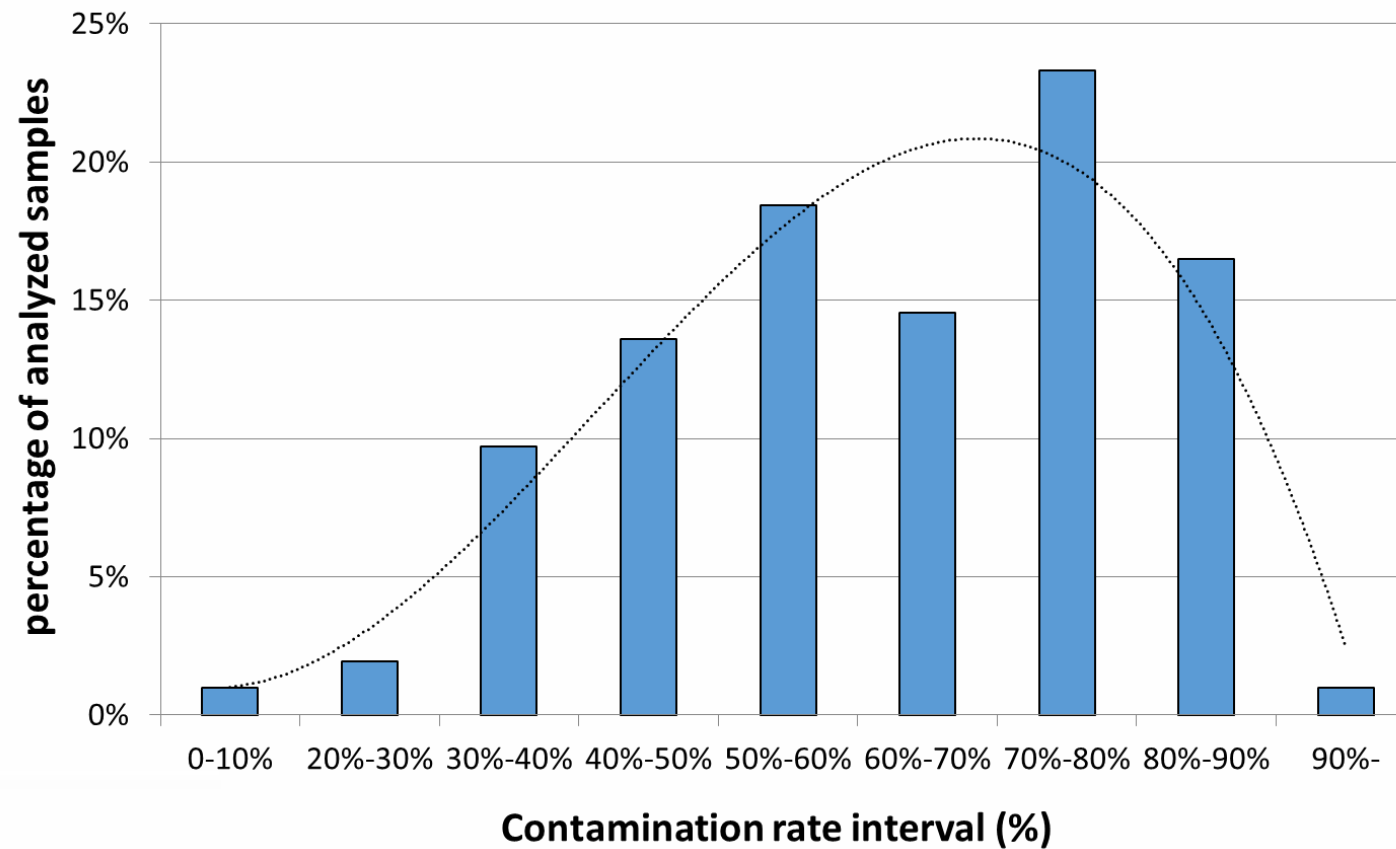
RESULTS (2012-2018)

Contamination rate (CR) by class of by crop



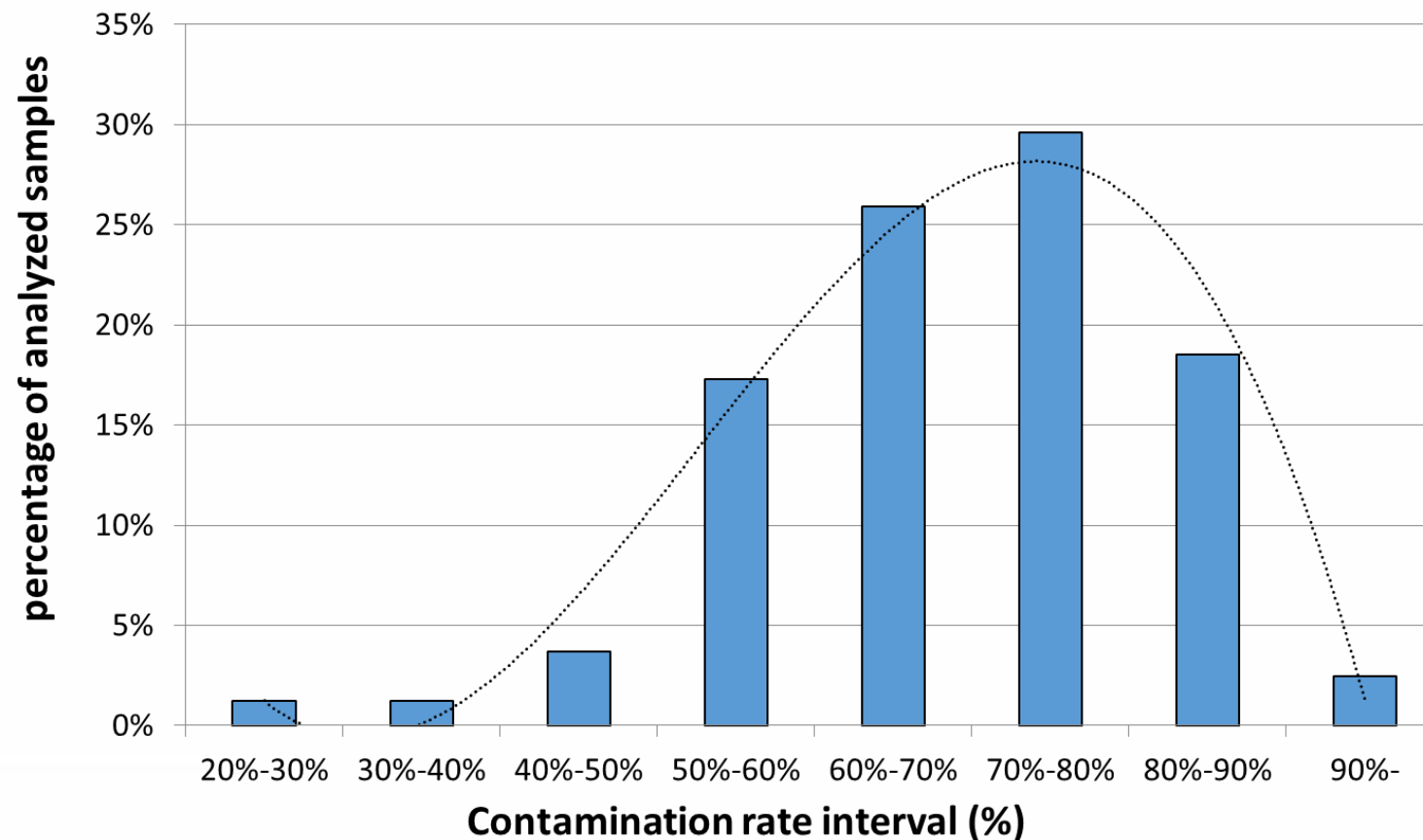
CONTAMINATION RATE : THE CASE OF MELONS

Percentages of analyzed melon mulching film samples according to contamination rate



CONTAMINATION RATE : THE CASE OF SHALLOT

Percentages of analyzed shallot mulching film samples according to contamination rate



❖ RAFU project's specifications:

- 1) Design a machine, which can guarantee a contamination rate lower than 50%.
- 2) This machine has to operate as fast as currently used ones.
- 3) This machine should bring better work conditions.

“RAFU” INNOVATION: TECHNOLOGY



1) How is it possible to decrease the contamination rate ?

⇒ by combining different cleaning processes on the same machine



blower

pole

grid

scraper

1) How is it possible to decrease the contamination rate ?

⇒ by combining different cleaning processes on the same machine



UAF is lifted and spread to facilitate the cleaning.

“RAFU” INNOVATION: TECHNOLOGY



2) How is it possible to maintain current workflow ?

⇒ 3 steps in one:



“RAFU” INNOVATION: TECHNOLOGY



2) How is it possible to maintain current workflow ?

⇒ Automatic adaptation of the 3 steps.



Speed and tensility regulation

3) How is it possible to improve work conditions ?

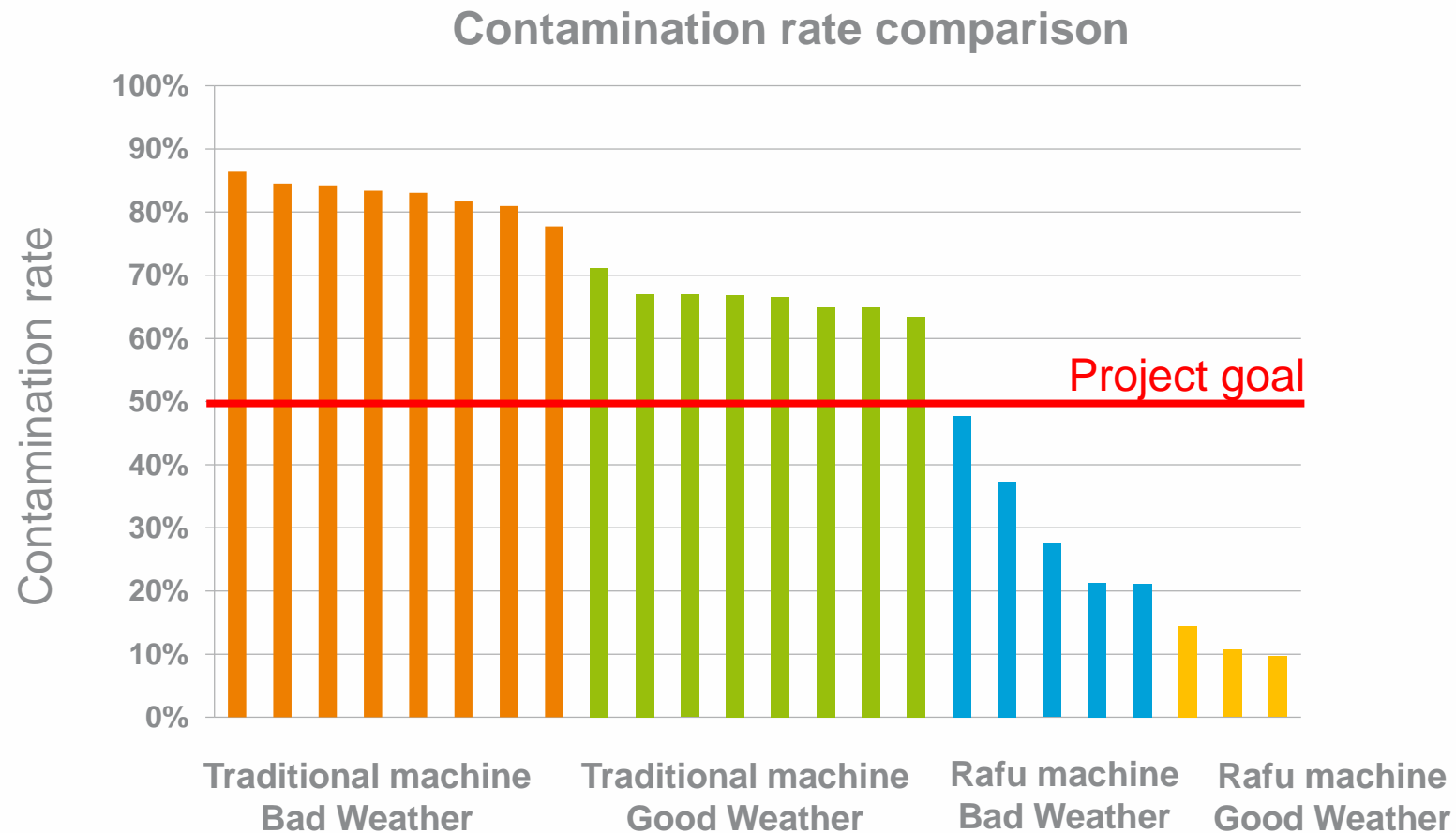


- All operation led from the tractor cabin
- Automatic regulations
- Only one round

“RAFU” INNOVATION: TECHNOLOGY



✦ Results:



“RAFU” INNOVATION: TECHNOLOGY



❖ Results:

	Traditional	RAFU Machine
Means	Tractor + triple hoe Tractor + triple reel 3 people	Tractor + RAFU machine 1 people
WorkFlow	16 ha/day	7 ha/day

RAFU II PROJECT: DISSEMINATION AND AWARENESS RAISING

❖ Project leader:



- ❖ Technical references and better knowledge (sampling, practices and methodologies) for various crops (incl. potatoes) in the South of France.
- ❖ Manufacturing of series machine (carrot).
- ❖ Adaptation of prototype to shallot.
- ❖ Design of prototype for melon.



THANK YOU FOR YOUR ATTENTION.

QUESTIONS ?

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