Case study Summary sheet

Context

CASE STUDY

Footprint use category: Supply option **Assessment time:** 2018

Business application: Biodiversity management & performance

Perimeter

		LUEFN Pressures	CC Pressure	Aquatic Pressures
Scope 1		☐	☐	☐
Scope 2		☐	☐	☐
Scope 3	Ferulic acid purchases	✔	✔	☐
	Downstream	☐	☐	☐

COMPANY'S IDENTITY

SOLVAY asking more from chemistry®

Industry	Manufacturing
Sub-industry	Chemistry
2017 turnover	EUR 10.9 billion
Listed	Euronext, BEL 20, CAC40

Why?

COMPUTE THE BIODIVERSITY FOOTPRINT OF SOLVAY'S FERULIC ACID SUPPLY, A SUB-PRODUCT OF RICE AND UNDER-STAND SOURCING IMPLICATIONS

When?

COMPUTATION IN NOVEMBER 2018 TO REFLECT CURRENT OPERATIONS

How often?

ONE OFF
TO BE RENEWED IF SOURCING CHANGES

What?

AVERAGE TERRESTRIAL BIODIVERSITY FOOTPRINTS PER COUNTRY ARE EVALUATED PER TON OF FERULIC ACID

For who?

INTERNAL USE
STRATEGY, SOURCING

How detailed?

SOURCING OPTIONS ARE EVALUATED AT THE COUNTRY LEVEL

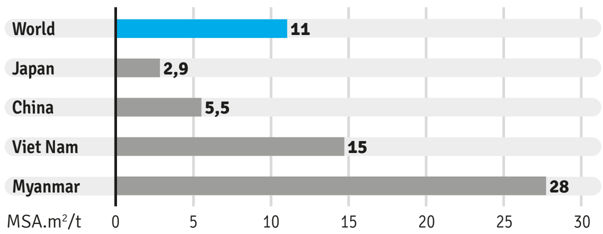
DATA COLLECTED

Item	Details	Source
Rice sourcing location	List of countries	Solvay
Transformation process	Detailed processes from rice to ferulic acid	Solvay / LCA
Transformation ratios	Mass ratio and allocation method for each process	Solvay / LCA

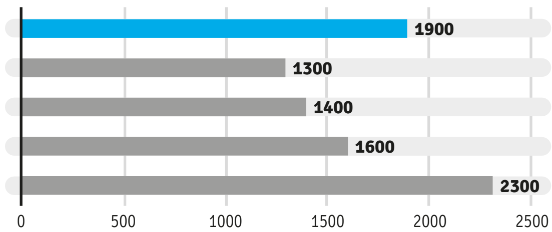
Footprint analysis

RESULTS

Dynamic footprint



Static footprint



(source: GBS calculations, December 2018)

KEY MESSAGES

➔ Dynamic and static footprints vary strongly depending on the origin of the rice purchased

➔ Pressure breakdown varies significantly among countries depending on the land conversion dynamic leading to very different situations.

IMPROVEMENTS

➔ Taking into account **aquatic biodiversity** which should play an important role for rice production

➔ Solvay is looking for additional information from its rice suppliers (location, fertilizer and chemical inputs , water consumption) which could be used to refine the results

4.2 Solvay

A CONTEXT AND OBJECTIVES

Solvay has already various ESG criteria in place to mitigate CSR risks in its upstream and downstream supply chains. Risk mapping is the cornerstone of a sustainable supply chain, enabling Solvay to be aware of the main CSR stakes outside its direct operations. Solvay aims to create sustainable value, particularly through partnerships with its suppliers for the joint development of solutions that address environmental and social issues. With this case study, Solvay is aiming to understand if it is technically possible and relevant for biodiversity to be one of them. In that context and since the GBS tool was most appropriate to assess crop commodities at its 2018 stage of development, Solvay chose ferulic acid whose production is based on rice. This compound is used to produce vanilla natural aroma. Solvay has different sourcing options and would like to evaluate the biodiversity footprint related to each of them.

In this case study, the GBS tool evaluates the footprint of rice production. The objectives are very similar to the Michelin case study (cf. section 4.1) and it is also a typical "supply option" application of the GBS. As ferulic acid and rice are purchases of Solvay, they fall within its Scope 3 (*cf.* Figure 10).

The footprint of the pressures generated by the transformation processes of rice into ferulic acid (land use of processing factories, greenhouse gas emissions, etc.) are not included in this study. The GBS is still under development, so only the impacts caused by the five terrestrial pressures listed in GLOBIO (land use changes, encroachment, fragmentation, climate change, atmospheric nitrogen deposition) on terrestrial biodiversity are assessed.

B METHODOLOGY

Solvay provided data relative to the transformation processes of rice into ferulic acid. This dataset comes from ecoinvent, a life-cycle analysis database, and describes all the intermediary steps to obtain ferulic acid from rice. For each transformation step, the information specified is:

- the initial product,
- an exhaustive list of sub-products obtained by transforming the initial product,
- the mass ratio of each sub-product, which is the quantity produced for 1 unit of initial product,
- the allocation ratio of each sub-product which reflects the share of initial product's biodiversity footprint which is allocated to the sub-product. In some cases, the share is equal to the mass ratio. In other cases, the allocation ratio reflects the relative economic value of the sub-product relative to the initial product. Economic value is a fair reflection of business incentives, but it is sometimes hard to evaluate as prices for the different compounds can be very volatile and are not always officially available. The share of the biodiversity footprint allocated to ferulic acid is low, respectively $1{,}5.10^{-3}$ % and $5{,}0.10^{-4}$ % if calculated on mass or on economic value.

In this case study, FAO's average country production yields are used. GHG emissions for rice production are also directly extracted from the FAO database. A precise GHG emissions assessment is particularly important for rice production as it is one of the most GHG intensive crop production due to significant methane emissions in the flooded rice paddies.

The GBS tool is used to compute the impacts on terrestrial biodiversity of the production of rice for different countries of origin. The methodology developed by CDC Biodiversité to compute biodiversity footprint for crop commodities is described in details in the first GBS technical paper (CDC Biodiversité, 2017).

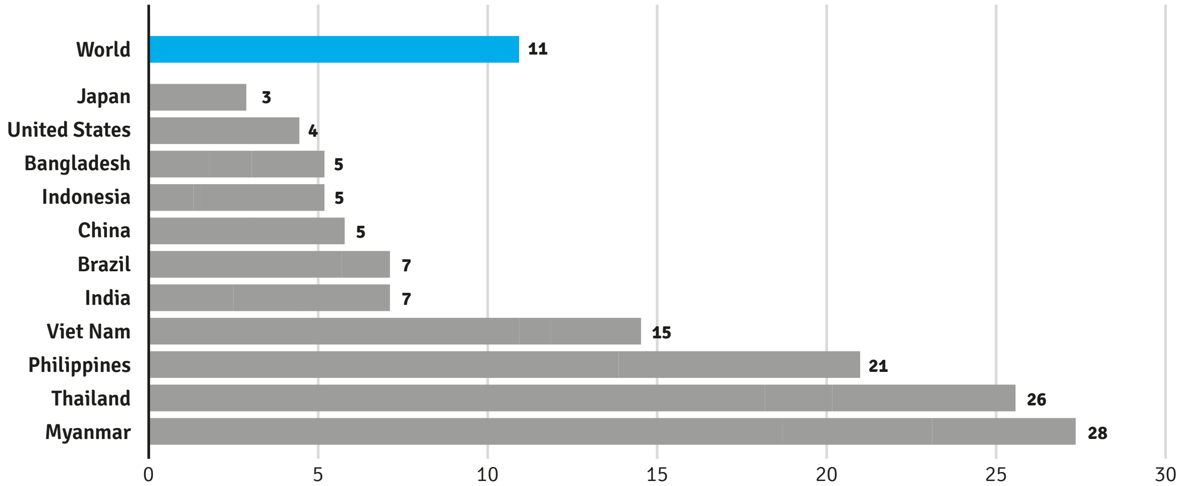


Figure 23: Dynamic footprint of rice (MSA.m²/t)
sourced from different countries (source: GBS calculations, December 2018)

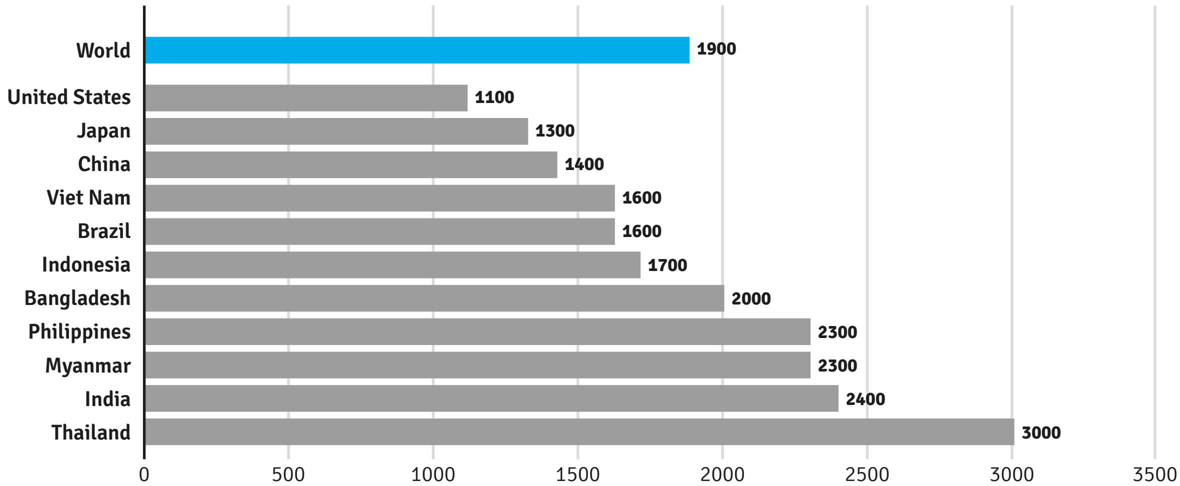


Figure 24: Static footprint of rice (MSA.m²/t) **sourced from different countries** (source: GBS calculations, December 2018)

Step	Product In	Products Out
1	Rice	Rice bran
		Rice husk
		White rice
		Rice brokens
2	Rice bran	Crude rice bran oil
		Rice bran meal
3	Crude rice bran oil	Soap stock
		Refined rice bran oil
4	Soap stock	Oryzanol
		By-products (1)
		Wastes
5	Oryzanol	Ferulic acid
		Cycloartenol

Table 4: Steps from rice to ferulic acid (source: Solvay, based on ecoinvent)

C RESULTS AND DISCUSSIONS

Dynamic footprint and its pressure split vary significantly from one country to another (Figure 23 and Figure 24). Dynamic footprint for Japan is the smallest with 2.9 MSA.m², almost 4 times less than the world average mix (11 MSA.m²) and almost 10 times less than Myanmar (28 MSA.m²). For countries where pressures from land conversions are expected to remain low (Japan or USA), the main driver of biodiversity loss is climate change. For countries where pressures from land conversions are expected to be high (Vietnam, Myanmar, etc.), spatial pressures (sum of land use change, fragmentation and encroachment) is a key driver.

Static footprint also varies significantly from one country to another (Figure 25), yield being by construction the main driver (see formula section 3.5.1 and Michelin case study). It is interesting to note that **static footprint values are consistent with ecoinvent "land use transformation" values**. For instance, for China, land use transformation is evaluated at 1 482 m^2 in ecoinvent: when applied an average MSA% of 8.1% for croplands, the static footprint would be about 1 362 m² (1482x0.919) which is exactly the same as the static footprint calculated with the GBS for China.

D LESSONS LEARNT

Results could be refined thanks to additional data from Solvay's suppliers, such as yield and land use dynamics. Further methodological developments will allow to evaluate the impacts on freshwater biodiversity. For a water intensive culture such as rice, these impacts could potentially be significant. This study was very interesting regarding GBS development as it allowed to tackle the methodological issues around transformed products, how to deal with the transformation process in terms of data and allocation between the studied product and its associated sub-products. Although results could be improved, this case study showed to Solvay that the differences between sourcing locations are significant, therefore it makes it relevant for them to add biodiversity to their ESG sourcing criteria list.