




# Global Agricultural Costing and Investment framework

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# Introduction and summary of work



Agricultural activity and the continuous croplands expansion at global scales exert a wide range of **pressures on natural ecosystems** and is expected to continue with **increasing world population** and **upscale demand**.

The debate of **land sharing** versus **land sparing** has emerged as a strategy to assess balances between **biodiversity conservation** and **high-yield agriculture**.



We develop an **agricultural costing and investment framework** to understand cost functions and test the hypothesis that **agricultural production in land sharing and sparing scenarios is less costly than in current practices at global scales.**

Through a bottom-up approach we gather **physical and financial information** for agricultural systems from inventory data, scientific literature as well as data surveys and calculate costs of production across **three distinct scenarios, business as usual (BAU), land sparing (MLS) and land sharing (TCS).**

Preliminary findings demonstrate that it would **cost approximately 40% less in MLS and TCS in comparison to BAU** to produce the same amount of food at a global scale.



Touch screen discussion part

# Methodological approach

- We construct a cost engineering framework in line with the **Farm Accountancy Data Network (FADN)** and the **Farm Business Survey (FBS)** accounting methods.
- Cost functions are disaggregated in **seven cost elements** and are distinguished between **variable** and **fixed** costs:
  - Seeds
  - Fertiliser
  - Plant protection
  - Labour
  - Fuel and energy
  - Financing
  - Infrastructure



# Data tools – Farm Business Survey



**Welcome to  
the Farm  
Business  
Survey**

The official source of farm  
income figures in England  
& Wales.

[FIND OUT MORE](#)



**Farm  
Benchmarking**

Compare your business to farms in the Farm  
Business Survey (FBS).

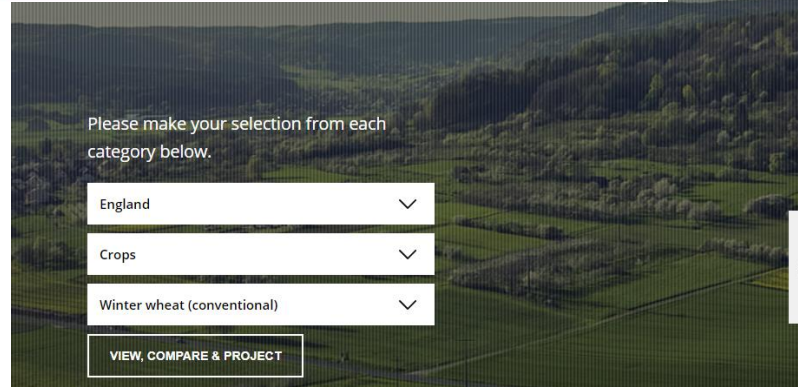
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**Projection  
Calculator**


FBS projection calculator is the unique internet  
tool that allows users to calculate projected  
margins into the future.


[ACCOUNTS](#) [ENTERPRISES](#)



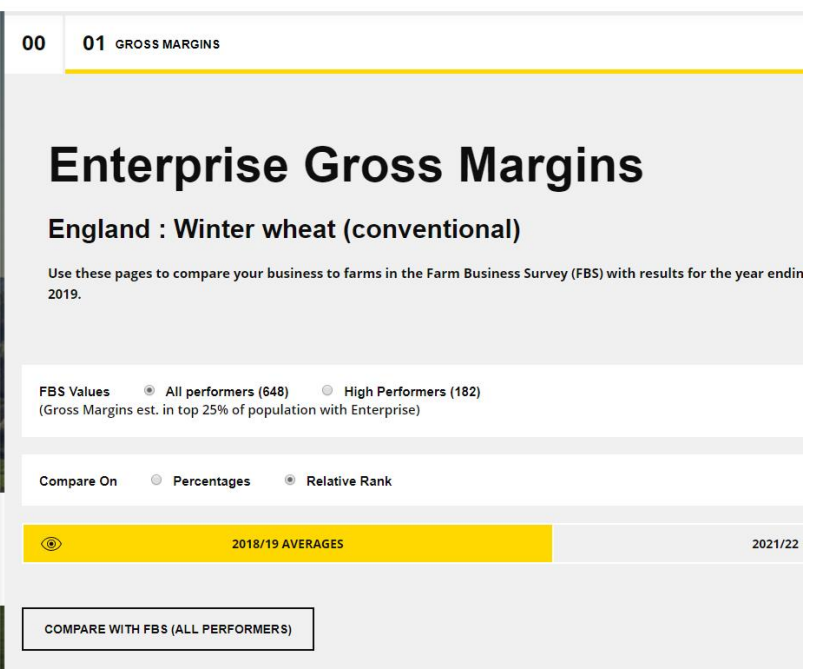
Please make your selection from each  
category below.

England 

Crops 

Winter wheat (conventional) 

[VIEW, COMPARE & PROJECT](#)



00 01 GROSS MARGINS


## Enterprise Gross Margins

England : Winter wheat (conventional)

Use these pages to compare your business to farms in the Farm Business Survey (FBS) with results for the year ending 2019.

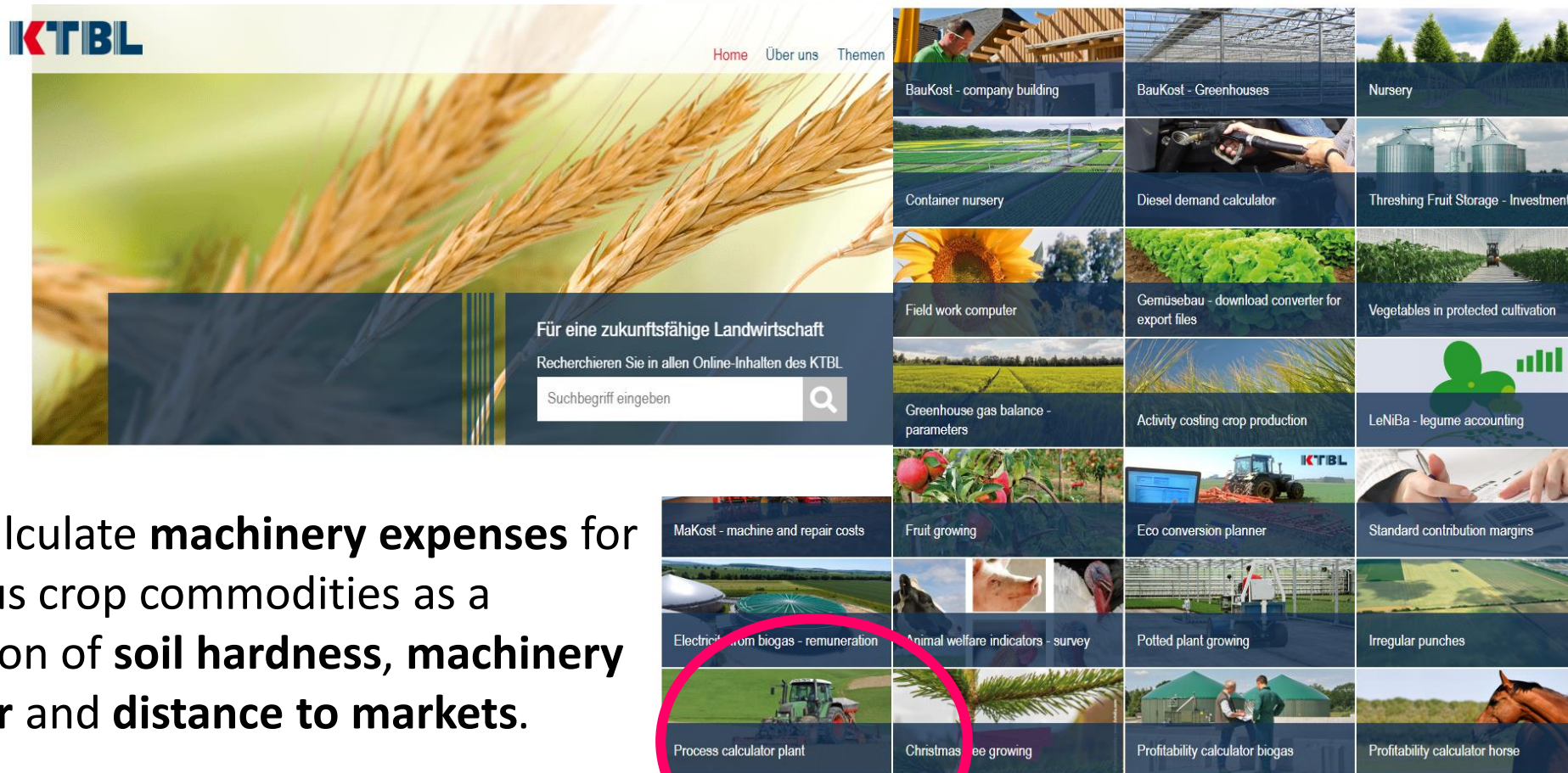
FBS Values ☒ All performers (648) ☐ High Performers (182)  
(Gross Margins est. in top 25% of population with Enterprise)

Compare On ☐ Percentages ☒ Relative Rank

 2018/19 AVERAGES 2021/22

[COMPARE WITH FBS \(ALL PERFORMERS\)](#)

# Data tools – KTBL



**KTBL**

Home Über uns Themen

Für eine zukunftsfähige Landwirtschaft  
Recherchieren Sie in allen Online-Inhalten des KTBL

Suchbegriff eingeben

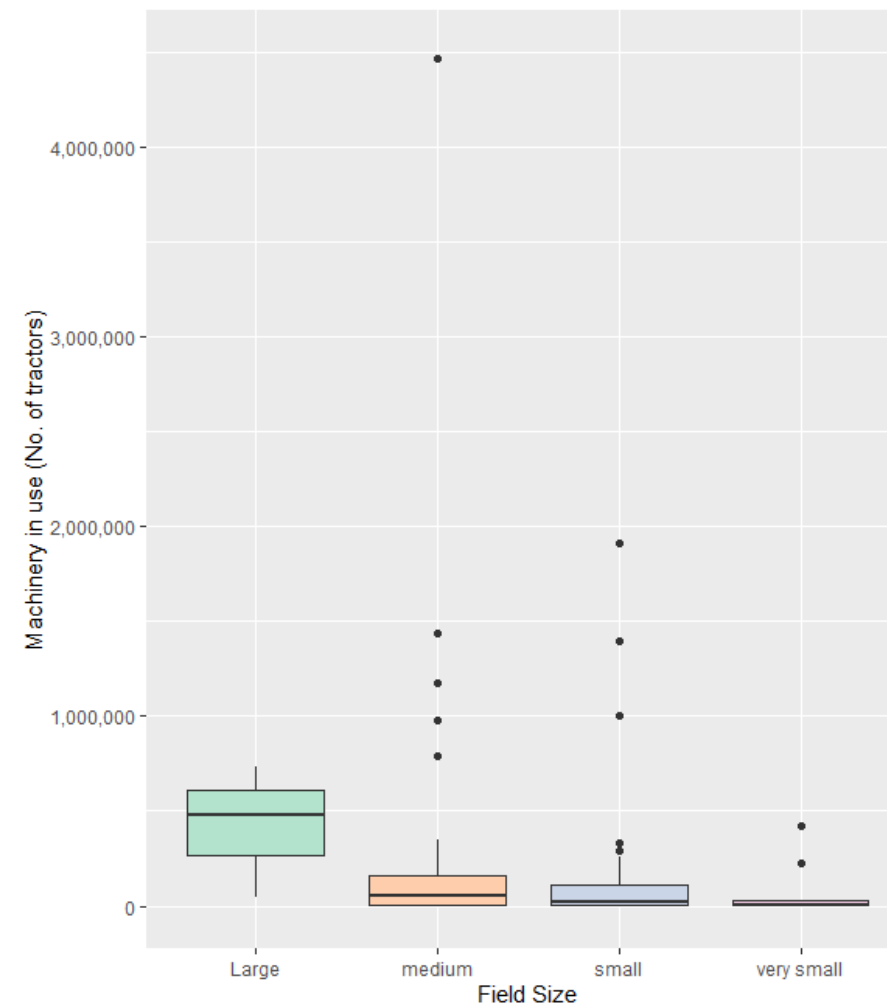
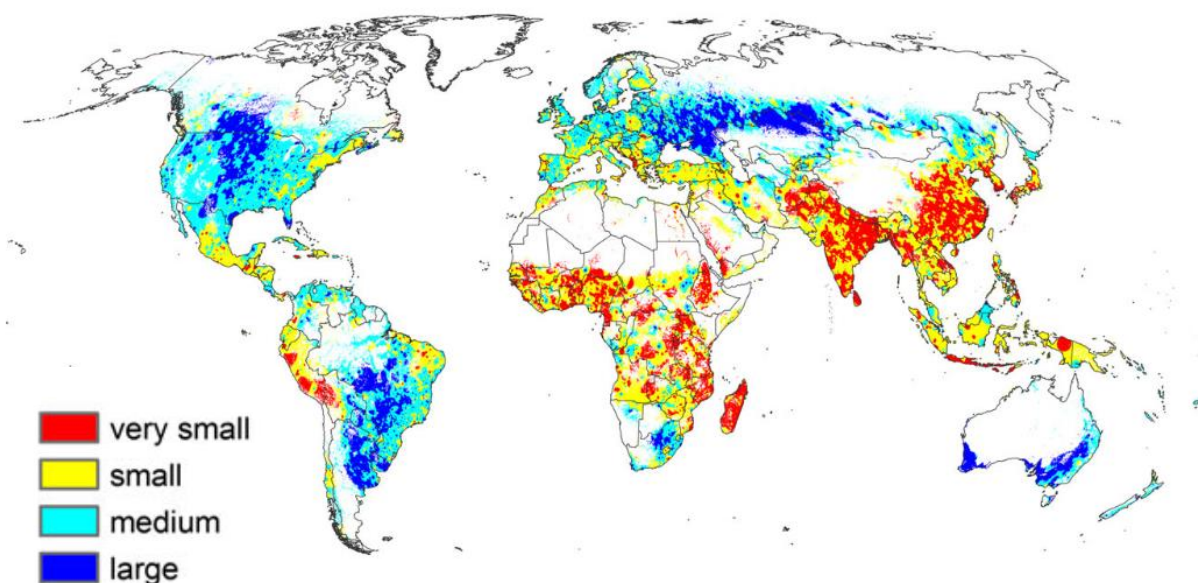
BauKost - company building	BauKost - Greenhouses	Nursery
Container nursery	Diesel demand calculator	Threshing Fruit Storage - Investment
Field work computer	Gemüsebau - download converter for export files	Vegetables in protected cultivation
Greenhouse gas balance - parameters	Activity costing crop production	LeNiBa - legume accounting
MaKost - machine and repair costs	Fruit growing	Eco conversion planner
Electricity from biogas - remuneration	Animal welfare indicators - survey	Potted plant growing
<b>Process calculator plant</b>	Christmas tree growing	Profitability calculator biogas
		Profitability calculator horse

We calculate **machinery expenses** for various crop commodities as a function of **soil hardness**, **machinery power** and **distance to markets**.

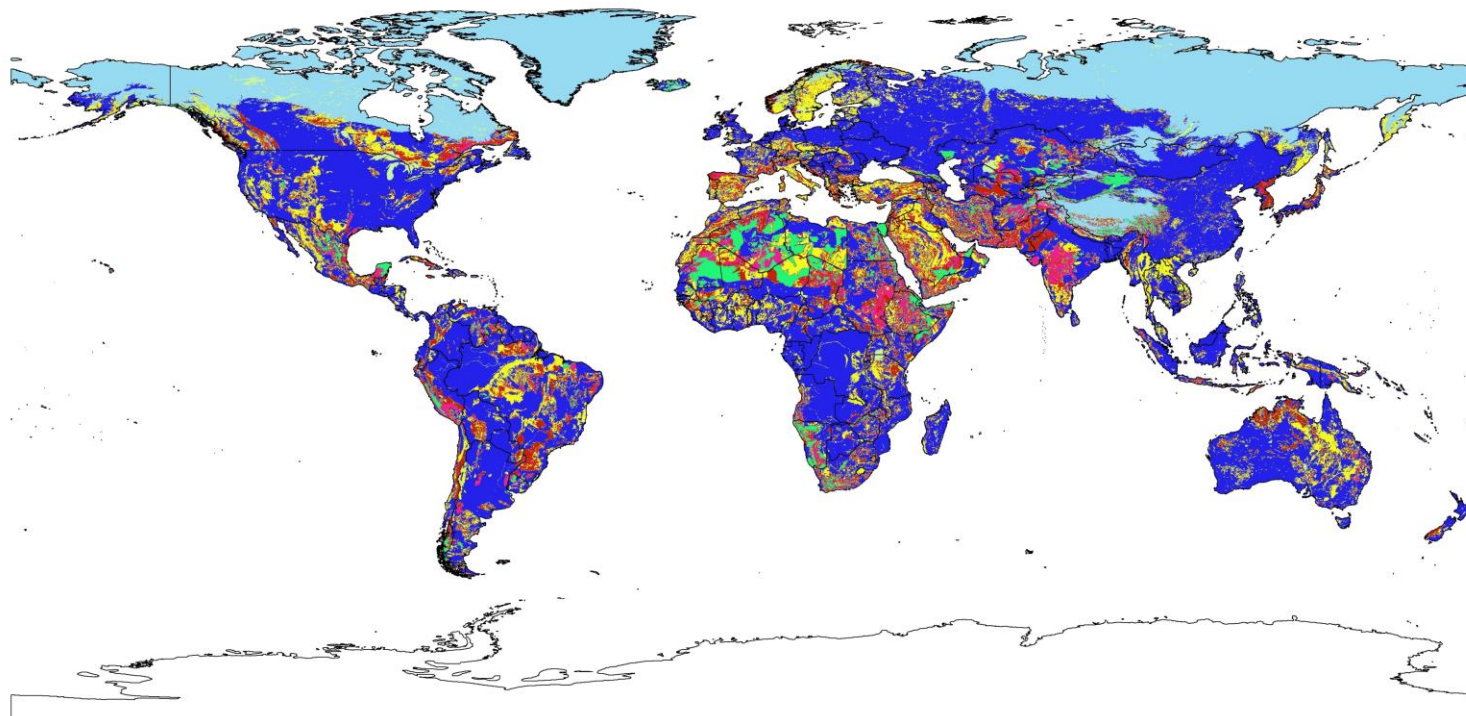


# Assumptions

Average **field size** (per country) is related to production practices such as **technology adoption**.



# Assumptions



## Legend

No Data
  1: No or slight limitations
  2: Moderate limitations
  3: Severe limitations
  4: Very severe limitations
  5: Mainly non-soil
  6: Permafrost area
  7: Water bodies

Soil workability indicates **tillage resistance** and thus, relates to differentiation of **machinery costs**.

		Soil workability		
		Light	Medium	Hard
Field size	Very small	1	4	0
	Small	31	33	4
	Medium	43	28	8
	Large	18	10	6

Fischer, G., F. Nachtergaele, S. Prieler, H.T. van Velthuisen, L. Verelst, D. Wiberg, 2008. *Global Agro-ecological Zones Assessment for Agriculture (GAEZ 2008)*. IIASA, Laxenburg, Austria and FAO, Rome, Italy

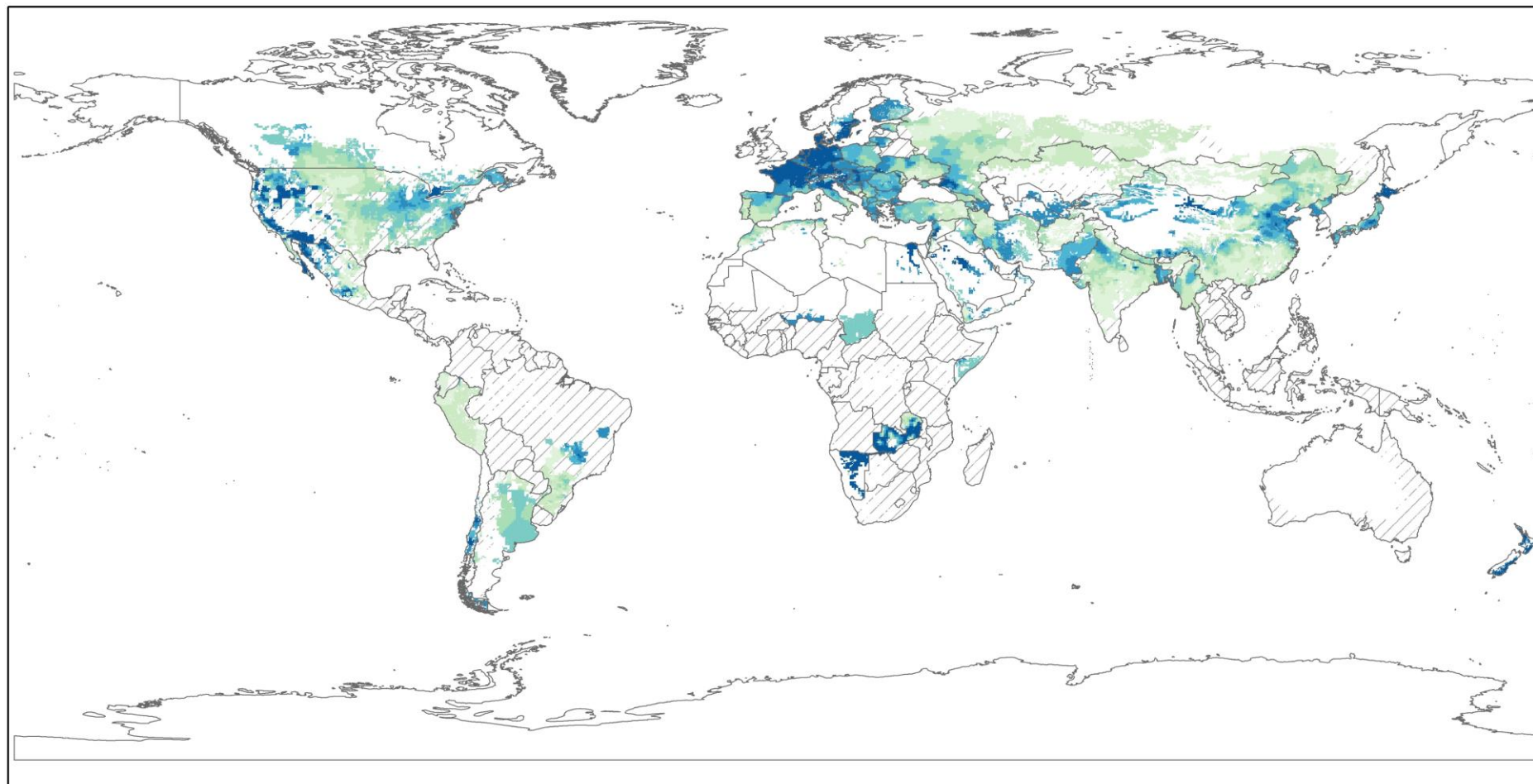


# Downscaling national financial data

We use physical data to estimate production intensity (Intensification factor -  $IF$ ) through input-output functions.

$$IF = 0.25 * \left( \frac{YLDG}{YLDG_{MAX_{CNTRY}}} + \frac{YLDG}{YLDG_{ATT_{MAX_{CNTRY}}} + \frac{FTN}{FTN_{MAX}} + \frac{FTP}{FTP_{MAX}}} \right)$$

# Downscaling national data - IF



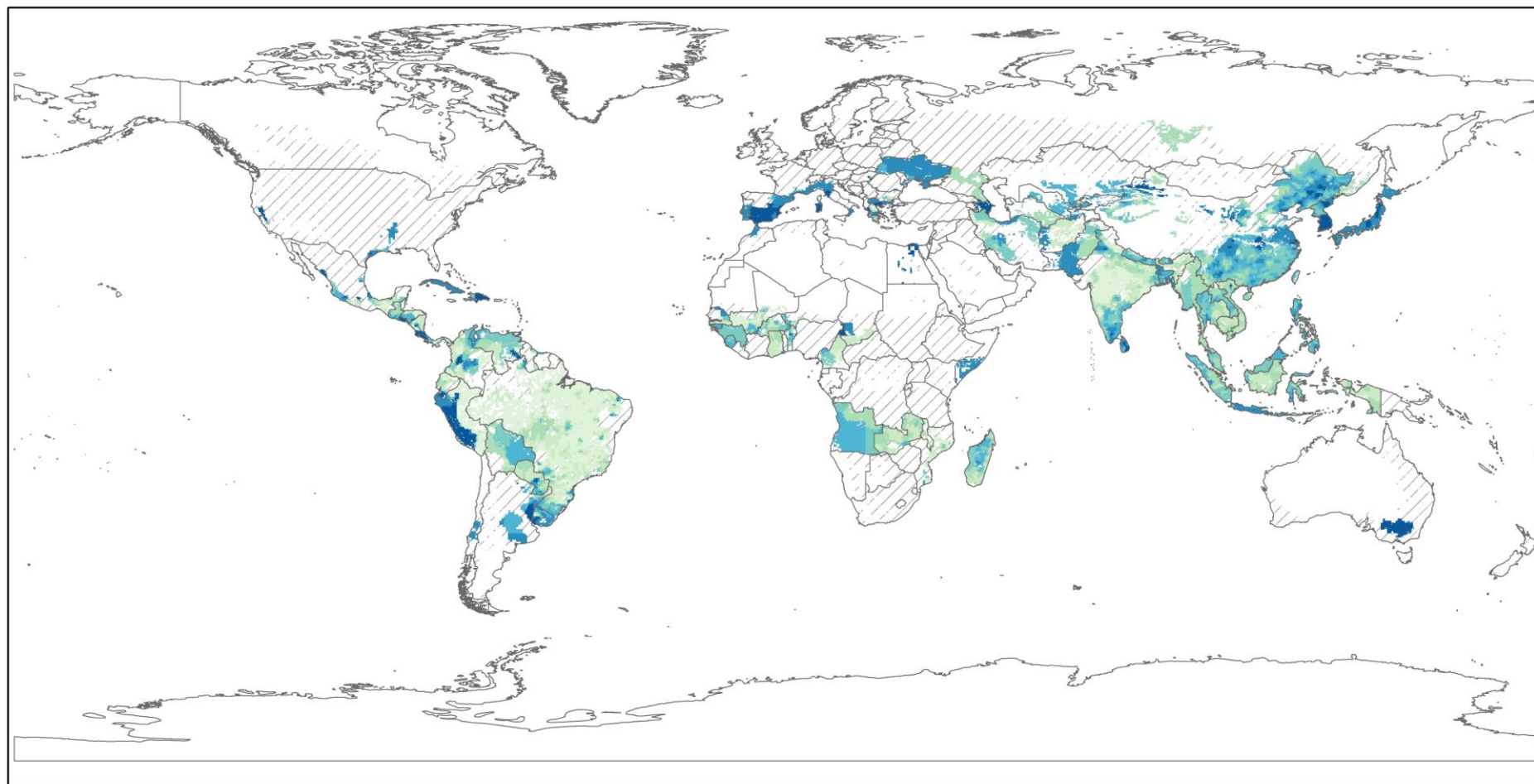
## Legend

IF rate Wheat I

IF rate range	Color
0.00	White
0.01 - 0.62	Lightest Green
0.63 - 0.66	Light Green
0.67 - 0.71	Medium Green
0.72 - 0.76	Teal
0.77 - 0.81	Light Blue
0.82 - 0.88	Medium Blue
0.89 - 1.00	Dark Blue



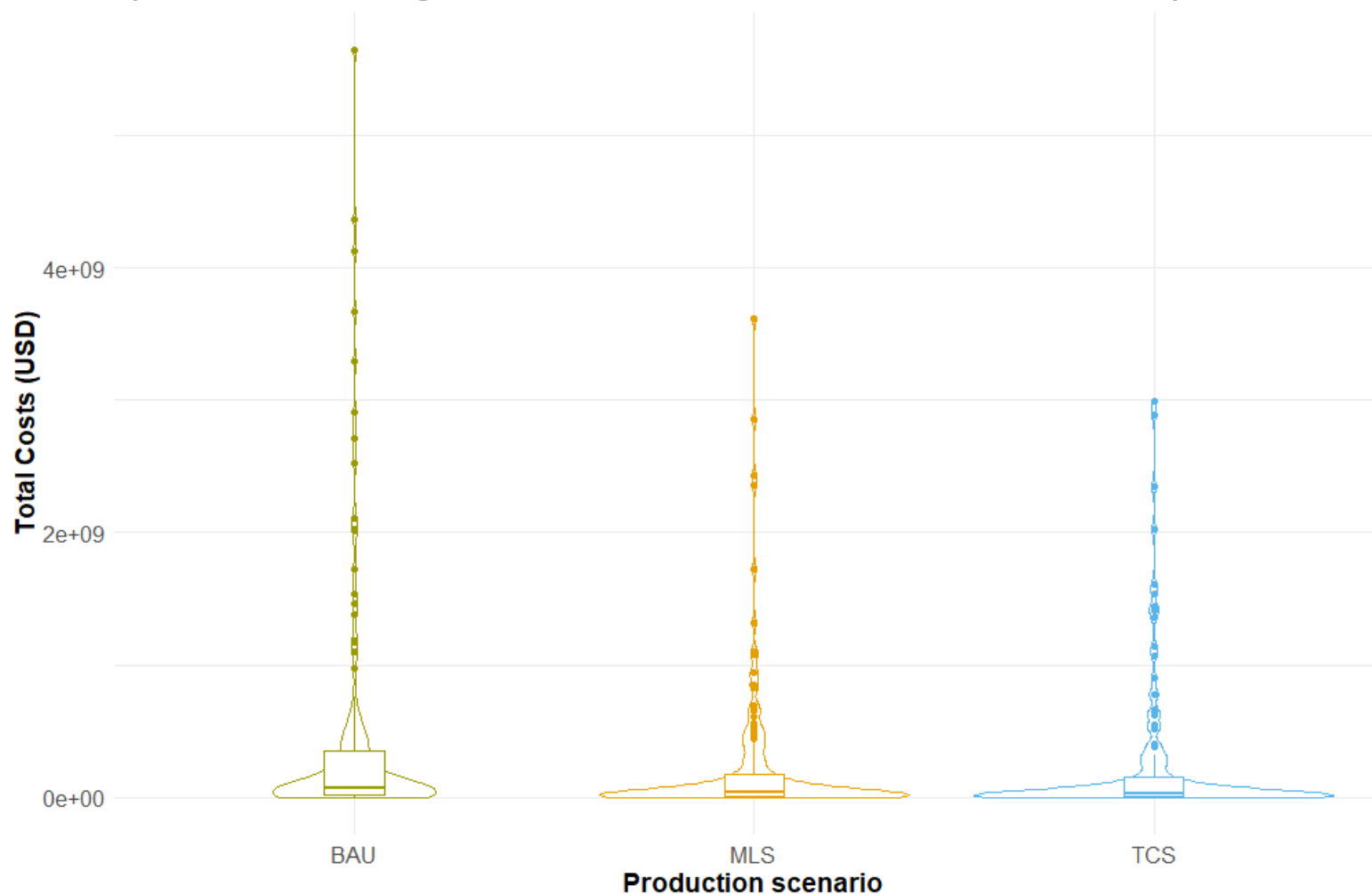
# Downscaling national data - IF



## Legend

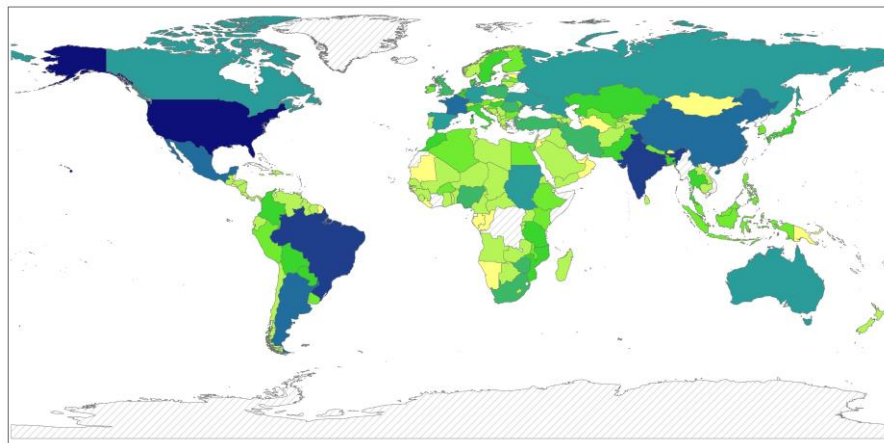
IF rate Rice I // 0.00 0.01 - 0.61 0.62 - 0.66 0.67 - 0.71 0.72 - 0.76 0.77 - 0.81 0.82 - 0.88 0.89 - 1.00

# Preliminary findings – Global Costs of production

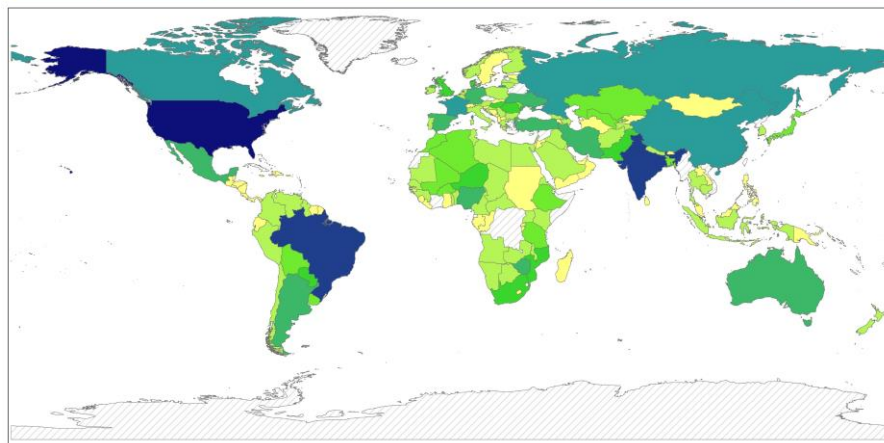
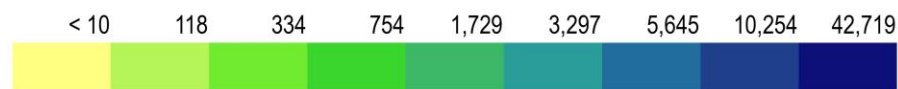




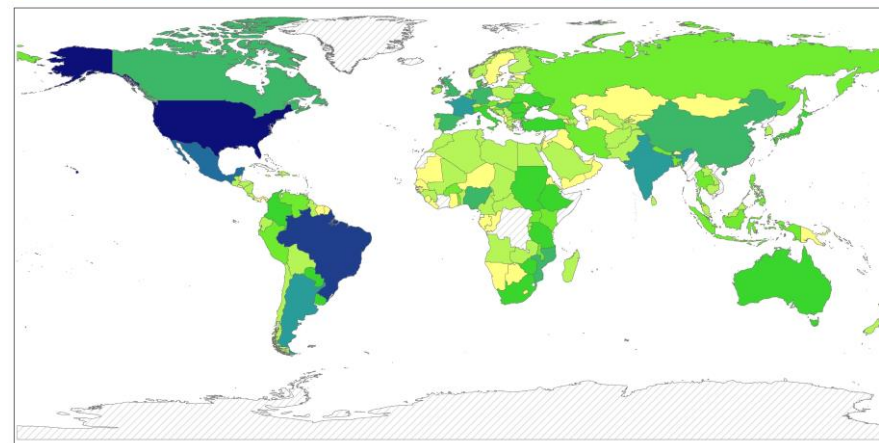
BAU Total Costs in million USD



TCS Total Costs in million USD

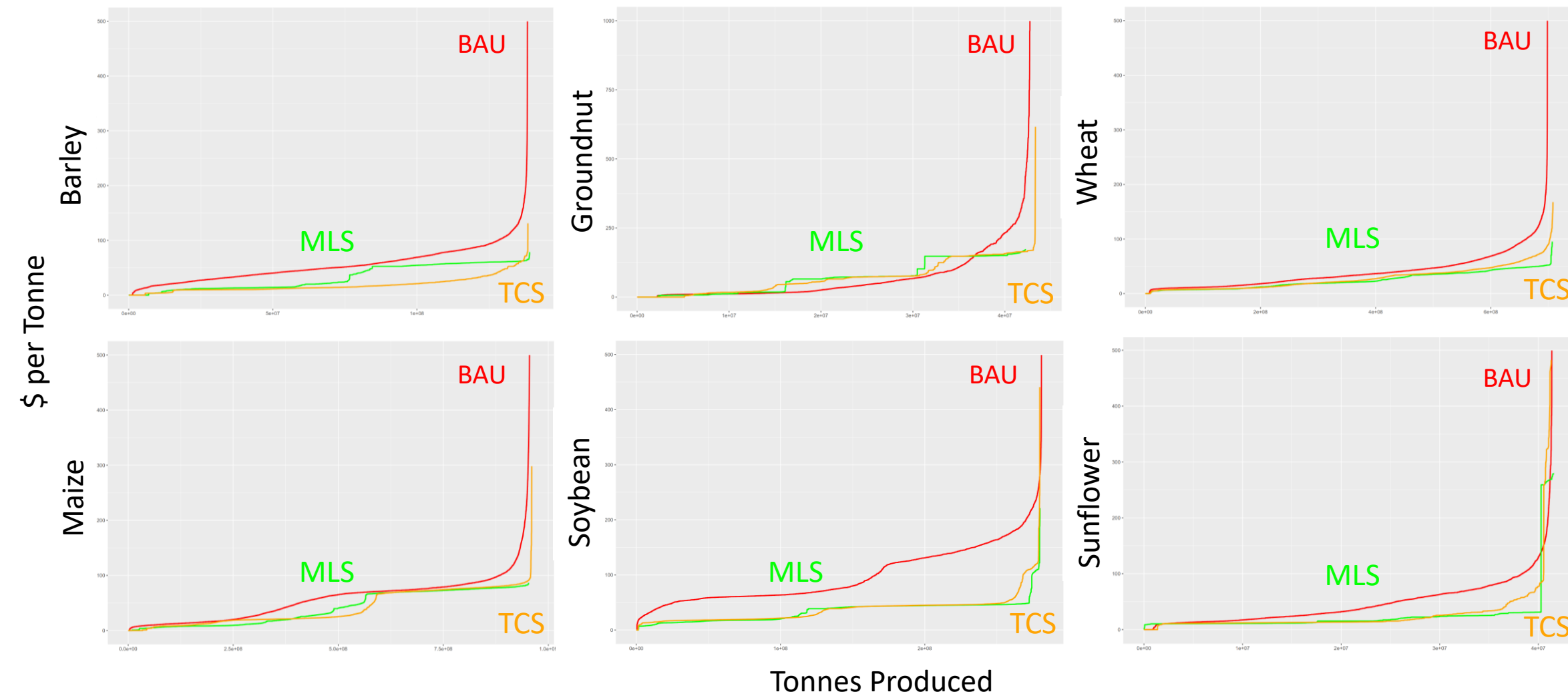


MLS Total Costs in million USD



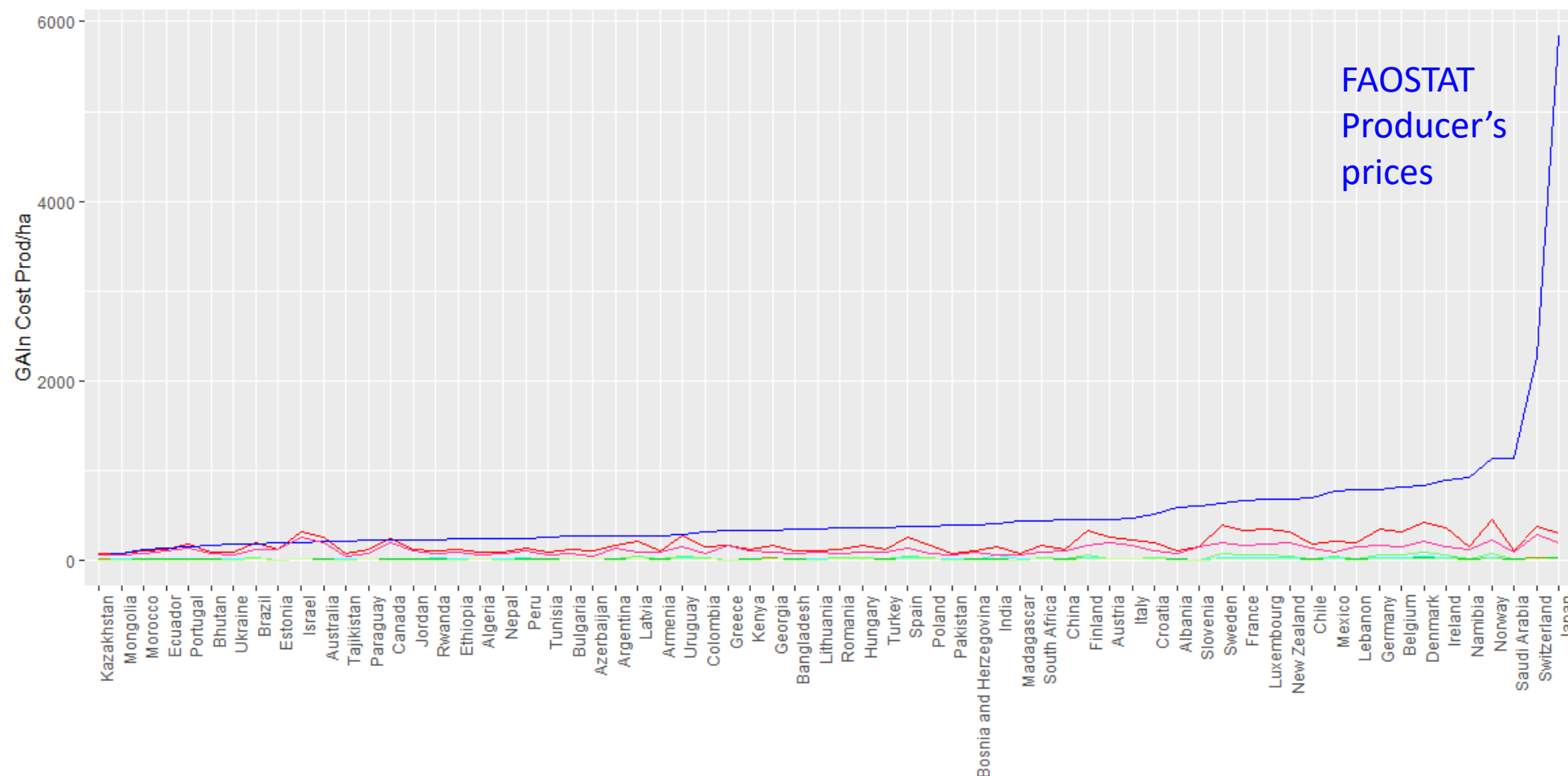
Preliminary findings  
– Global Costs of  
production mapped

# Preliminary findings – Supply Curves



# Preliminary cross validation – FAOSTAT

Wheat cost of production and Producers' prices per country





# Preliminary cross validation – FAOSTAT

Potatoes cost of production and Producers' prices per country

