

Barriers to adaptation and mitigation to climate change in livestock farms of Europe, Africa and South-America

Frey H.¹, Vayssières J.¹, Messad S.¹, Koslowski F.², Stienezen M.³, Blanchard M.¹, Silvestri S.⁴, Cardoso Viera P.⁵, Pocard R.¹, García de Jalón S.⁶, Lecomte P.¹

¹CIRAD, France ²SRUC, Scotland
³WUR, Netherlands ⁴ILRI, Kenya
⁵UFRGS, Brazil ⁶UPM, Spain

A GENERIC QUESTIONNAIRE

1. General data on the farmer and his environment
2. Farmer's perception of climate change (CC) and local adaptation and mitigation
3. Likelihood of introducing mitigation and adaptation options

Adaptation options: use of crop varieties with different growing season; diversify plant species at field and farm scale; cooling of animals; use more robust/local breeds; change animal species

Mitigation options: spread over time mineral fertilizer applications; increase the proportion of legumes in the crop land area; use more productive breeds; increase cereals in the feed ration; add nitrate or lipids in the diet of ruminants; apply nitrification inhibitors onto croplands and/or grassland; cover slurry stores; use on-farm anaerobic digester; increase crop-livestock interactions; fire control

LARGE-SCALE INVESTIGATION

- 196 farms have been surveyed throughout 15 different areas
- We selected farms that were representative of the dominant systems found in each area
- Industrial systems, mixed beef and dairy systems and grassland-based systems have been investigated in **Europe** and **South America**
- In **Africa**, Grassland-based systems have been investigated

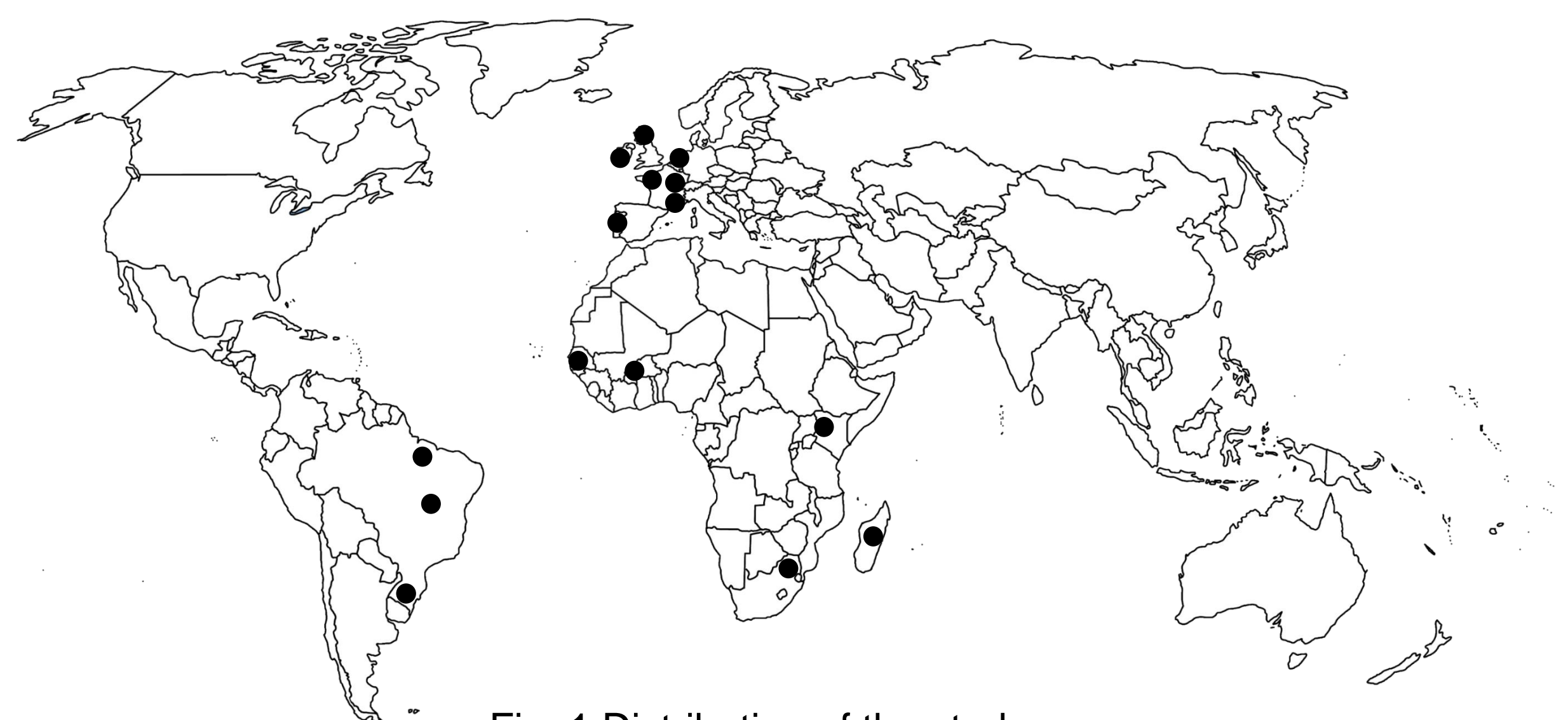


Fig. 1 Distribution of the study areas.

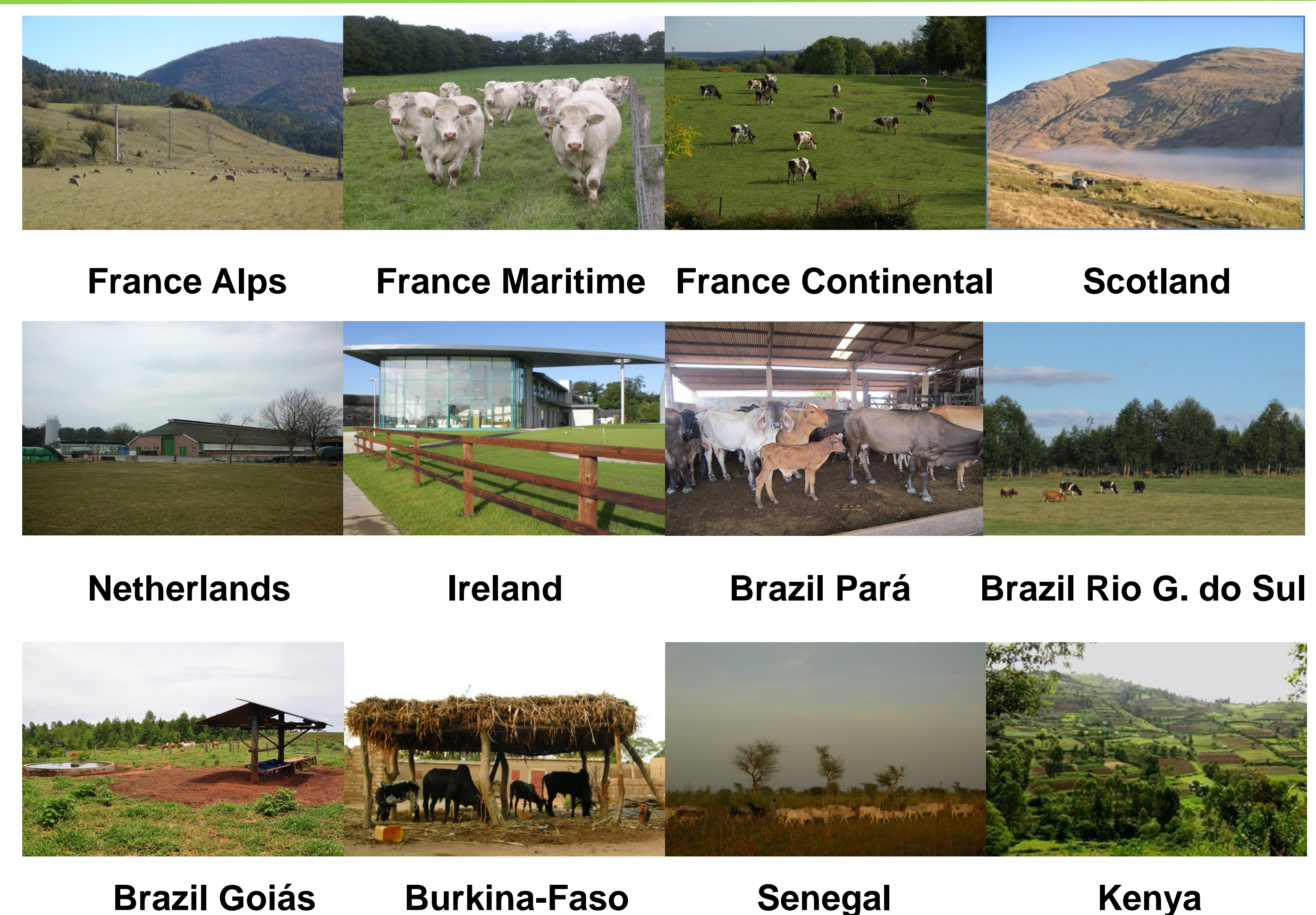


Fig 2. Diversity of systems in the study areas.

FARMERS ARE VERY RECEPTIVE TO CC

Across all study areas, more than 80% of the **farmers believe in CC** and more than 60% observe a **CC-effect on their on-farm yields** (especially in Africa). However, less than 50% of the farmers believe in a contribution of agriculture to CC.

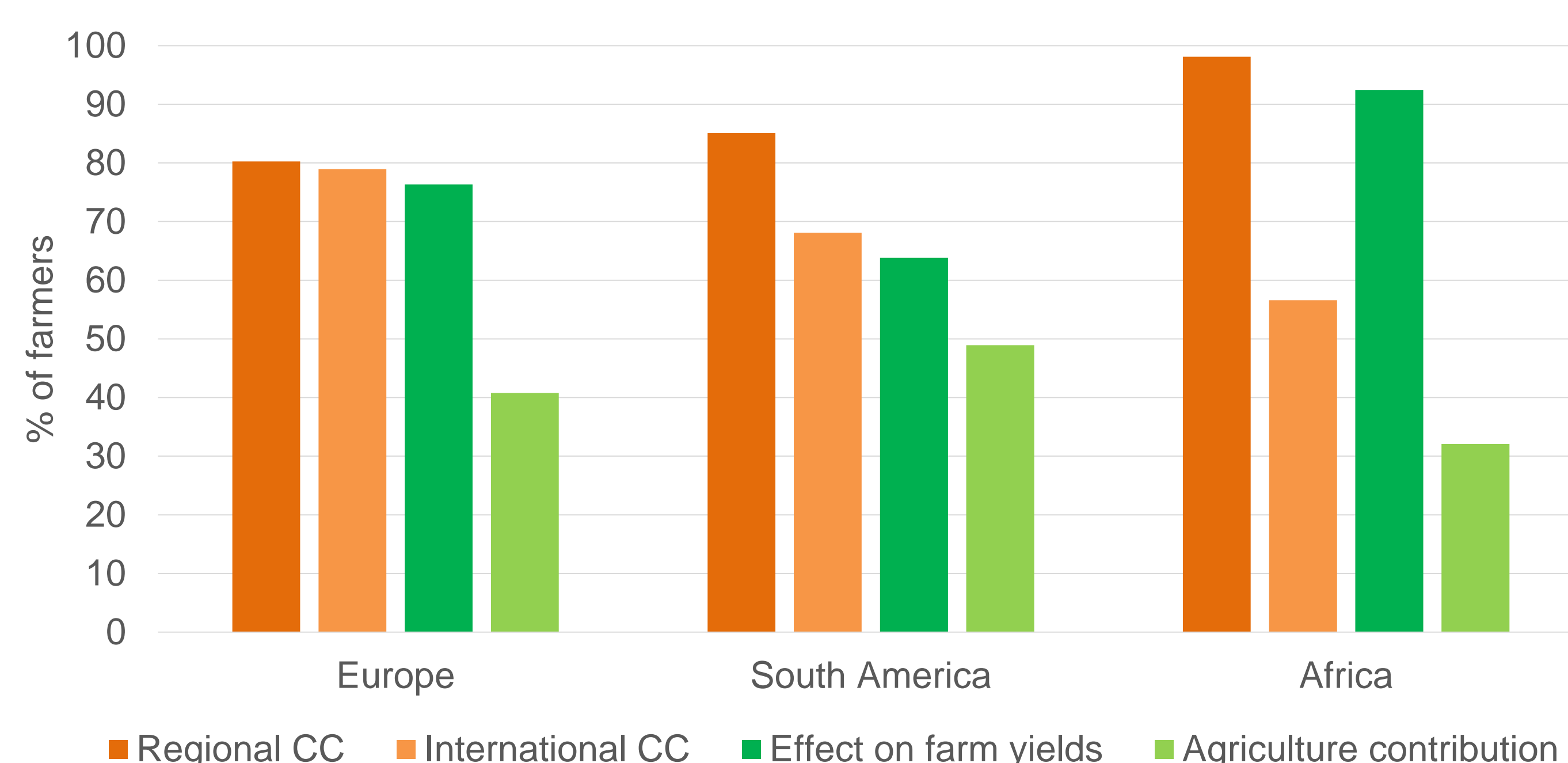
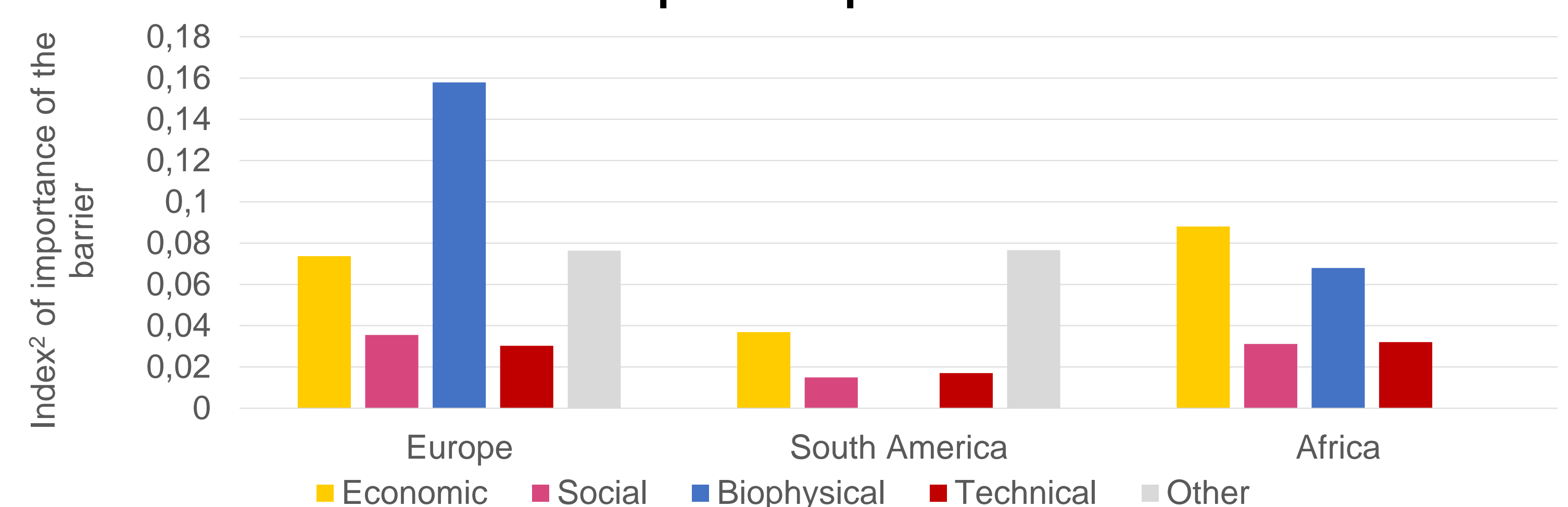


Fig 3. Farmers' perceptions of: CC (regionally & internationally), effect of CC on farm yields and agriculture contribution to CC.

CONTRASTING IMPORTANCE OF BARRIERS¹ BETWEEN CONTINENTS

- **Europe has the highest barrier index²**. South America has the lower barrier index
- **Economic** barriers are predominant in hampering both adaptation and mitigation options
- **Biophysical** barriers occur especially for adaptation options. They are predominant in Europe and Africa, and absent in South America

a. Adaptation options



b. Mitigation options

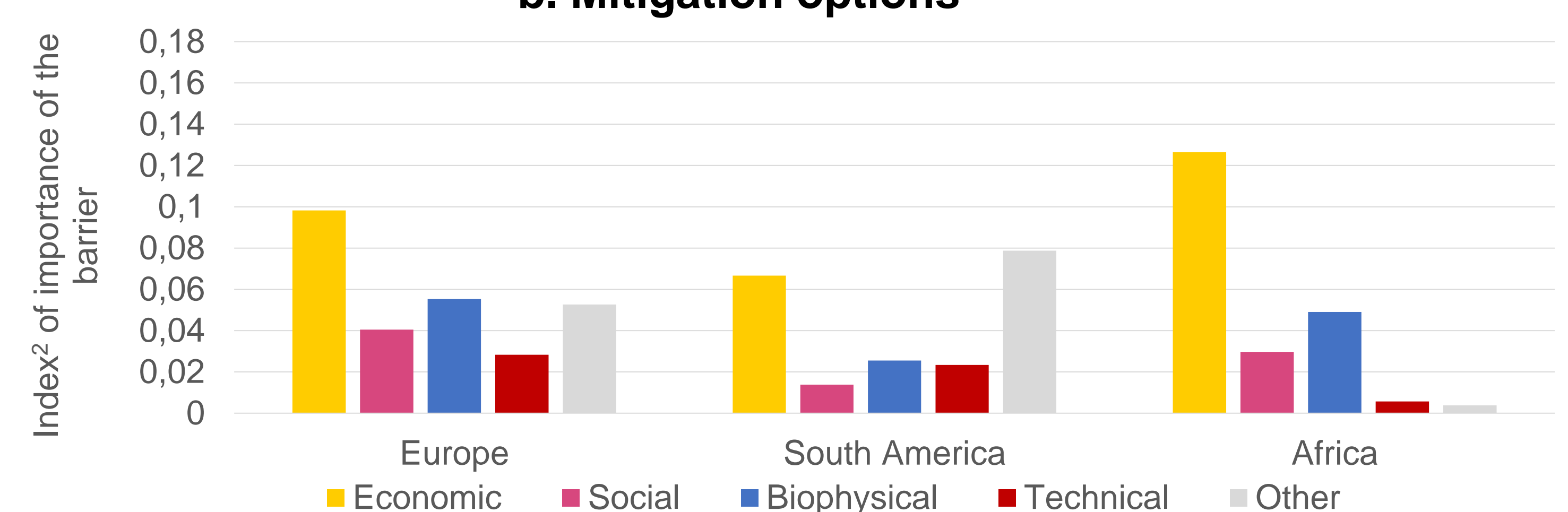


Fig 4. Repartition of the barriers¹ per continent that hamper adoption of options of adaptation (a) and mitigation (b).

¹ Typical examples of barriers per type

Economic barriers: too costly and/or not profitable; commercial legislation constraints (standards, legislation, labels)

Social barriers: lack of skills; labour not available; lack of interest

Biophysical barriers: soil and/or climate not adapted

Technical barriers: negative effect on agronomic and zootechnic performances; farm system organization incompatible

² Calculation of the Index of importance of the barrier

The following index correspond to the importance of a given barrier type B for a given option type O and a given continent C. We sum for every farm the number of times the farmer mentions the barrier type O to adoption of the option type C, as follow:

$$\text{Index}_{B,O,C} = \frac{\sum_i^n z_i}{n \times m \times l}$$

With: z = barrier's choice= 0 if not; 1 if yes
 i = the farmer number i of the considered continent C
 n = total number of studied farms on the continent C
 m = number of mitigation options proposed
 l = number of barriers of type B given by farmers