

EGU2020-20661

<https://doi.org/10.5194/egusphere-egu2020-20661>

EGU General Assembly 2020

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



History and geography of land productivity to assess the challenges for food security

Marta Tuninetti, Luca Ridolfi, and Francesco Laio

Politecnico di Torino, DIATI, Torino, Italy (marta.tuninetti@polito.it)

Increasing population and changing diets toward larger proportion of meat products have driven agricultural production increase over the past decades and will probably push it in the upcoming years. The analysis of the agricultural production increase is at the centre of the international debate since the 1800-century Malthusian prediction of exponentially growing population outstripping linearly increasing production.

In this study, we show how agriculture has changed over the past decades through the concept of a newly developed land productivity (LP) indicator, which measures the amount of calories, proteins, and fats produced per hectare of land and merges the variegated macronutrients spectrum of a 140-crops production basket. Land productivity indicator adds to the more widespread (crop specific) yield indicator the nutrient content of each product.

We find that the global LP has increased by 2.6-2.9% per year over 1961-2016 for calorie and protein, and 3.7% for fat. This confirms an important boost of the global productive regime whose growing rate has been able to overcome that of population. Humans can rely on larger amounts of calories (+1640 kcal/cap/day), proteins (+69 g/cap/day), and fats (+55 g/cap/day) supply. In this global picture, different macro-regions exhibit relevant heterogeneities. In particular, we found that Eastern Asian and Latin American countries could escape the Malthusian trap around the Nineties through both LP increase and ad hoc variation in the composition of their basket of products. However, this transition seems far to happen in Sub-Saharan Africa and South Asia, where the daily productive regime has remained stable since the Sixties, despite the variation of the basket composition.