

## **NEWSLETTER N°6, June 2020**

1. Cropland Research Group GRA Co-Chairs message
2. Modelling global N<sub>2</sub>O emissions from croplands
3. New tools to facilitate soil parameters determination: emphasis in soil organic carbon
4. Extensive livestock farming and climate change: an in-depth approach
5. Calculation of greenhouse gas emissions for cattle and sheep in Spain
6. Special issue on the cultural landscape approaches and climate change policy
7. Upcoming events

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### **1. Cropland Research Group GRA Co-Chairs message**

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Covid-2019 has changed our lives in 2020 and also the value chains linked to farming. The reduction of mobility has increased the local-food use while limiting the capacity of farmers to sell their products abroad through the usual national and international transport channels in many countries. Moreover, the lack of family events, parties and celebrations caused by the covid-19 linked health restrictions was associated to the reduced needs of high quality and added-value products, which in turn reduced the revenues of farmers. Covid-19 showed abruptly some of the deficiencies of global markets and the way to rethink value chains associated to specific local market context due to the mobility restrictions. Local markets are a key activity promoted by some governments such as those linked to the European Union through the Green Deal in order to combat climate change. Both bioeconomy and circular economy are crucial to combat climate change through the optimization of the use of the local resources and the promotion of innovations linked

to the sustainable use of land . Covid-19 situation can be an opportunity to re-think our way of farming and re-structure the farming value chain strategies. Naturally some different contexts exist worldwide, as in Brazil where a new record grains harvest was obtained in the session 2020/2021, reaching to 250 millions of tons, mainly with soybean and corn. Also a high demand from importer countries, mainly China, maintained important income to farmers and agriculture was the only economic sector of Brazil with positive results in the last semester. Again food security and food safety are in the worldwide top agenda and must be aligned with global and local viable strategies to reduce climate change impacts.

*Source: Croplands Research Group Co-Chairs Team, María Rosa Mosquera-Losada, Ladislau Martin-Neto, Mark Liebig.*

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## 2. Modelling global N<sub>2</sub>O emissions from croplands

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Quantification of N<sub>2</sub>O emissions from cropland is highly uncertain due to complex biotic and abiotic factors that influence N<sub>2</sub>O production. Recent bottom-up approaches estimating N<sub>2</sub>O emission from cropland reflect this uncertainty, ranging from 1.5 to 5.0 Tg N yr<sup>-1</sup>. As IPCC Tier 1 method assumes temporally and regionally constant emission factors (EFs), more detailed approaches are needed to reduce estimation uncertainty at finer spatial scales.

To improve global N<sub>2</sub>O emission estimates from cropland, Wang et al. (2019) evaluated cropland N<sub>2</sub>O emissions from 1961 through 2014 using a spatially referenced non-linear model (SRNM) with N-rate-dependent emission factors upscaled from 1206 field observations at 180 locations. Outcomes from the model confirmed IPCC Tier 1 default EFs for upland crops during the period but found 67% greater EFs for paddy rice. Emission factor estimates were least well constrained for upland crops in parts of the world with limited measurement data (e.g., Africa, Russia, South America).

Collectively, the evaluation highlighted the need for more accurate estimates of N<sub>2</sub>O emissions from cropland using observation-based non-linear EFs and survey gridded N-input data.

The full article is accessible at <https://doi.org/10.1093/nsr/nwz087>.

*Source: Mark Liebig (USDA-Agricultural Research Service, USA).*

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### 3. New tools to facilitate soil parameters determination: emphasis in soil organic carbon

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A Special Section of the [European Journal of Soil Science](#) (EJSS) will be published in the volume 75, issue 5 (September 2020), and contains a small selection of papers based on the presentation made in two sessions organized by Commission 2.5 during the [21<sup>st</sup> WCSS](#) held in Rio de Janeiro, Brazil in August 2018. One of the sessions, chaired by Ladislau Martin-Neto (Embrapa/Brazil and co-chair CRG/GRA) and Siobhan Staunton (INRA-France), focused on the advances in analytical techniques to study soil interfacial reactions with as little disturbance and separation of components as possible. The other, chaired by Siobhan Staunton and Jeferson Dieckow (Federal University of Paraná, Brazil), focused on the control of biogeochemical cycles by soil interfacial reactions with emphasis on climate regulation by carbon sequestration, productivity by nutrient storage and recycling, detoxification by adsorption and microbial breakdown of pollutants. About 120 posters and oral presentations were made.

Two of selected papers were based in a presentation made by Dr. Débora M.B. P. Milori, from Brazilian Agricultural Research Corporation- Embrapa, as an invited speaker, in the session devoted to advances in analytical techniques to study soil interfacial reactions. The two-part paper, accepted by EJSS, by Villas-Boas, Franco, Martin-Neto, Gollany, and Milori describes the principles and applications in Soil Science of Laser-induced breakdown spectroscopy (LIBS). These papers give a broad overview of this technique, which has the advantages of minimal sample preparation, and therefore avoidance of inherent creation of artifacts. It is used in-field to characterize samples within seconds, producing multi-element analysis. Furthermore, the technique does not involve hazardous materials or waste. The results may be qualitative or quantitative depending on user-experience and prior knowledge of the samples. The critical analysis of these papers indicates how matrix effects can be minimized and background signal normalized to optimize the technique. With appropriate calibration, physical characterization can be made by applying multivariate methods to measured elemental composition.

In the [first part](#), the authors demonstrate the application of LIBS to the characterization of soil pH, the degree of humification of soil organic matter, and the determination of soil texture. In the [second part](#), the authors review the use of LIBS to assess soil health to improve sustainable agricultural production from measurements of plant nutrients, toxic elements, and soil organic carbon content, with the capacity to generate more detailed and less expensive soil maps aligned with precision farming demands.

Libs technique was in recent years reemerged as a powerful and robust technology after curiosity rover, developed by Nasa and sent to Mars in 2011, have used it as a tool for rocks and soil composition analysis, as illustrated in Figure 1.

a)



b)

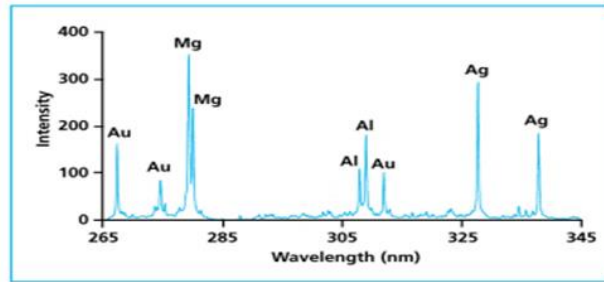


Figure 1: Nasa`s rover curiosity illustration that used a miniaturized LIBS spectrometer to soil and rock analysis in Mars (a) a LIBS typical spectrum of a solid material (b).

In Figure 2 it is shown two LIBS spectra obtained in Optics and Photonics Laboratory of Embrapa Instrumentation, in Brazil, from two different soils. In these two published papers in EJSS, the procedures for adequate soil elements quantification by LIBS are detailed. In this Embrapa`s Photonics lab a new automated LIBS spectrometer system was developed and permits a larger number of soil samples analysis (around 1,000 samples/per day) and without generation of chemical compounds residues, as happen in conventional soil samples laboratories.

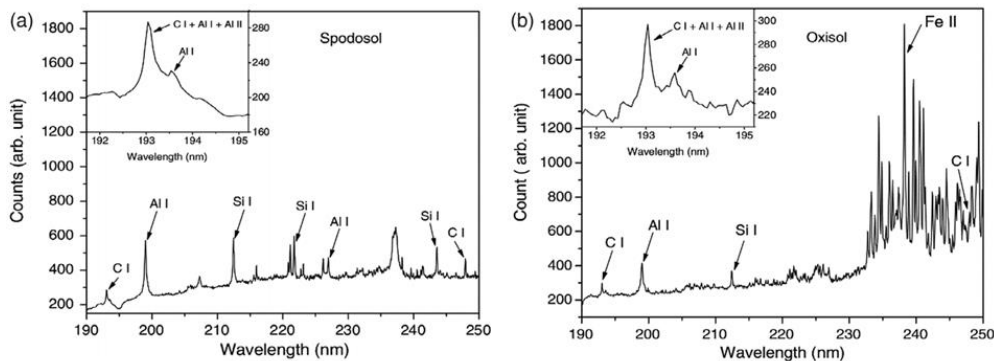


Figure 2: LIBS spectra of two soils, a spodosol (a) and an oxisol (b), showing the main emissions lines in the region, including C lines (reprinted from work of Nicolodelli et al., 2014, Applied Optics, 53, 2170-2176; and also presented in Villas-Boas et al., EJSS (DOI: 10.1111/ejss.12889)).

Source: Ladislau Martin-Neto (Embrapa, Brazil).

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#### 4. Extensive livestock farming and climate change: an in-depth approach

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The technical report, “Extensive livestock farming and climate change: an in-depth approach” was co-edited by the [Entretantos Foundation](#) and the [Platform for Extensive Livestock Farming and Pastoralism](#). This report compiles and organizes an intense shared effort to address the role of grazing in adaptation and fighting against climate change. The report collects up-to-date technical and scientific information about greenhouse gases behaviour in pastoralist systems, their emissions, their relationship with grazed ecosystems, their coping capacity, and their potential to mitigate the effects of climate change. The report content is organized in numerous boxes describing and referring to scientific papers, reports, and technical documents in Spanish and English, which help substantiate contents and found opinions.

The technical report “Extensive livestock farming and climate change” can be downloaded [here](#).

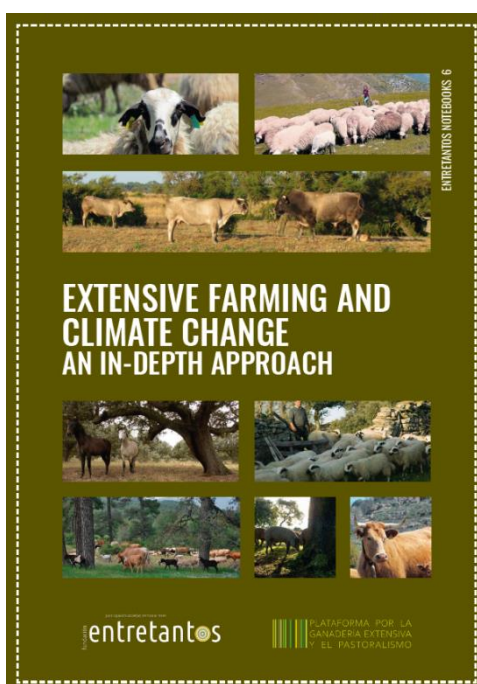


Figure 3: Cover of the report “Extensive livestock farming and climate change”.

Source: Website of the [Platform for Extensive Livestock Farming and Pastoralism](#).

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## 5. Calculation of greenhouse gas emissions for cattle and sheep in Spain

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The technical documents that establish the zootechnical bases for calculating the dietary balance of nitrogen and phosphorus for [cattle](#) and [sheep](#) and the bases for calculating the methane emissions corresponding to enteric fermentation have been recently published by the Spanish Ministry of Agriculture, Fisheries, and Food. These two new technical documents are added to the existing ones for white pigs, laying birds, meat birds, and equines.

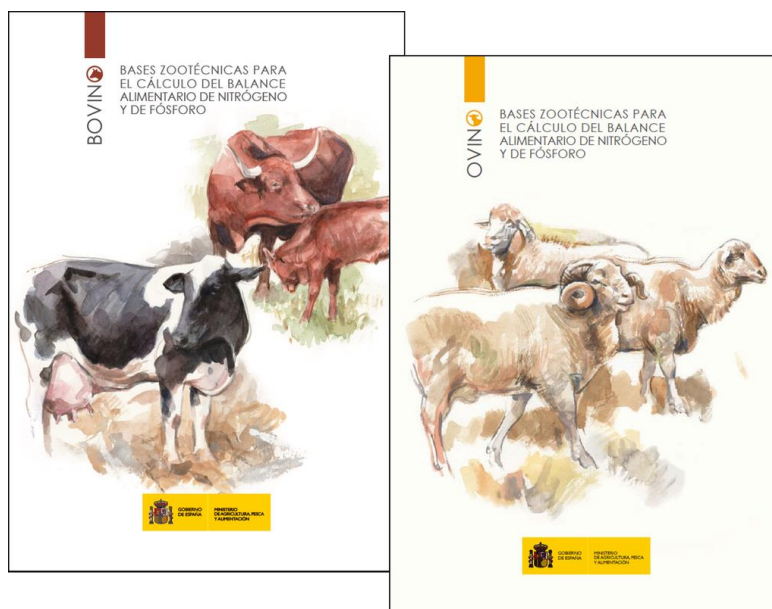


Figure 4: Technical documents to calculate greenhouse gas emissions for [cattle](#) and [sheep](#) in Spain.

The objective of these technical documents is to improve the emission estimations of the "National Emission Inventory" and the "Balance of Nitrogen and Phosphorous in Spanish Agriculture". To achieve this objective, a methodology to determine national excretion coefficients and emission factors linked to the productive activity of livestock has been developed. The developed methodology satisfies the requirements established in the latest editions of the IPCC guides (2006) and EMEP / EEA (2013), allowing the emission estimations of NH<sub>3</sub>, NO, NO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>, COVNM, as well as particulate matter (PM<sub>2,5</sub>, PM<sub>10</sub>, and TSP) with an advanced level of complexity (TIER II).

The technical documents include historical data from 1990 to 2015 with different categories of livestock according to age, physiological state, and production system (stabling and grazing). The data will be reviewed as scientific and technical knowledge advances and, at least, every five years.

The technical reports can be downloaded [here](#).

Source: Nuria Ferreiro-Domínguez (University of Santiago de Compostela, Spain).

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## 6. Special issue on the cultural landscape approaches and climate change policy

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A special issue of the [Climate](#) journal (open access journal by MDPI) will be accepting papers on the cultural landscape approaches and climate change policy. The Guest Editors of this Special Issue are Dr. Allison M. Chatrchyan (Cornell University, Ithaca, NY, USA), Dr. Ahmadreza Shirvani Dastgerdi (University of Florence, Italy) and Prof. Dr. María Rosa Mosquera-Losada (University of Santiago de Compostela, Galicia, Spain).

This Special Issue aims to review discourses and frameworks and contribute to the state-of-the-art knowledge of the relationships between climate change, cultural landscapes, and local sustainable adaptation. It will provide background pieces on options, empirical investigation of potential local climate change adaptation and mitigation strategies, and discuss opportunities and challenges in facilitating new approaches to climate change adaptation that incorporate cultural landscapes. Topics of interest include but are not limited to:

- Reviews of existing indicators, methods, and tools for the assessment of climate change impacts on cultural landscapes and cultural heritage resources
- Analyses of the cultural landscape approach and integrated landscape approach to climate change
- Reviews focused on the challenges and opportunities of integrating climate change mitigation and adaptation policies with cultural landscapes
- Methods of improving adaptive capacities of local institutions
- Protecting cultural landscapes using climate-smart agriculture, agroforestry or agroecology approaches

Manuscripts should be submitted online at [www.mdpi.com](http://www.mdpi.com). The paper submission deadline is 1<sup>st</sup> August 2021. More information [here](#).

*Source: María Rosa Mosquera-Losada (University of Santiago de Compostela, Spain).*

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## 7. Upcoming events

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**Due to the global development of the Covid-19 outbreak, some events were postponed. Please see below the new available dates**

**VIII REMEDIA Workshop (NEW DATE)**

The VIII REMEDIA workshop will be hosted as a virtual event during during **22<sup>th</sup> – 23<sup>rd</sup> September 2020**. REMEDIA is a scientific network for mitigation of greenhouse gas emissions in the agroforestry sector and the main focus of this years' workshop will be the circular economy as a catalyst for sustainability environmental of the Spanish primary sector. More information [here](#).

**28<sup>th</sup> General Meeting of the European Grassland Federation (NEW DATE)**

The 28<sup>th</sup> General Meeting of European Grassland Federation (EGF) will be arranged in a virtual format during **19<sup>th</sup> – 22<sup>nd</sup> October 2020**. The meeting will give delegates the first-hand opportunity to see and experience how today's state-of-the-art practices in grassland and ruminant production are utilised in Finland to produce milk and beef products that have been ranked as one of the highest quality products in the world. The meeting will be also the stage for you to represent and hear about the recent advances and novel approaches in grassland research. More information [here](#).

**71<sup>st</sup> Annual Meeting of the European Federation of Animal Science (NEW DATE)**

The 71<sup>st</sup> Annual Meeting of the European Federation of Animal Science will be hosted as a virtual event during **1<sup>st</sup> – 4<sup>th</sup> December 2020**. There will be virtual sessions with speakers and participants. This virtual event will offer the animal science network the best opportunity to share their research in the most updated and scientifically advanced forum in the world. More information [here](#).

**8<sup>th</sup> ATF-EAAP Special Session (NEW DATE)**

The 8<sup>th</sup> ATF-EAAP special session will be hosted as a virtual event under the topic "What livestock has to offer to biodiversity and healthy soils". The session would like to engage in discussions with farmers, industries, scientists, policy-makers, and society. The outcomes of the session will be discussed with a large panel of European stakeholders during the 10<sup>th</sup> ATF seminar. More information coming soon [here](#).

**CMRA 2021 Summer School**



The Leibniz Centre for Agricultural Landscape Research ([ZALF](#)) and the International Crops Research Institute for the Semi-Arid Tropics ([ICRISAT](#)) invite applications for an international summer school entitled “Modelling approaches for climate risk and climate change adaptations in the context of sustainable intensification in semi-arid West Africa” (CMRA2021). The summer school will take place at the ICRISAT regional headquarter in Bamako, Mali, during 21<sup>st</sup> – 28<sup>th</sup> February 2021. The aim of the course is to enhance awareness of the potential role and limitations of crop modelling in assessing climate risk and supporting sustainable intensification among the region’s next generation of researchers and agricultural policy makers. More information [here](#).

#### **14<sup>th</sup> European Farming Systems Conference** **(NEW DATE)**

The 14<sup>th</sup> European Farming Systems Conference (IFSA – European Group) will be held at the University of Évora, Portugal, and hosted by the Institute of Mediterranean Agricultural and Environmental Sciences during **28<sup>th</sup> – 1<sup>st</sup> April 2021**. The main focus of this years’ conference will be Farming Systems Facing Climate Change and Resource Challenges. More information [here](#).

#### **II World Congress on Integrated Crop-Livestock-Forestry Systems** **(NEW DATE)**

The II World Congress on Integrated Crop-Livestock-Forestry (ICLF) Systems will be held in Campo Grande-MS, Brazil, during **3<sup>rd</sup> – 6<sup>th</sup> May 2021**. This congress is an excellent opportunity for exchanging experiences and knowledge as well as updating on the latest research, development, and innovation about ICLF systems around the world. More information [here](#).

#### **4<sup>th</sup> Agriculture and Climate Change Conference**

The 4<sup>th</sup> Agriculture and Climate Change Conference will be held in Dresden, Germany, during 9<sup>th</sup> - 11<sup>th</sup> May 2021. The Conference will focus on the likely impact of climate change on crop production and explore approaches to maintain and increase crop productivity into the future. More information [here](#).

#### **5<sup>th</sup> European Agroforestry Conference** **(NEW DATE)**

The 5<sup>th</sup> edition of the European Conference on Agroforestry will be held in Nuoro, Sardinia, Italy during **17<sup>th</sup> - 19<sup>th</sup> May 2021**. The conference will bring together worldwide researchers, practitioners, policy-makers, public authorities to discuss the role of research and innovation in agroforestry towards the development of a sustainable European Bioeconomy, while exploring its potential in fostering environmental, economic and social prosperity. More information [here](#).

**18<sup>th</sup> International RAMIRAN Conference (NEW DATE)**

The 18<sup>th</sup> International RAMIRAN Conference will be held in Cambridge, UK, during **14<sup>th</sup> - 17<sup>th</sup> September 2021**. The conference will focus on developing strategies to maximize the efficiency of organic materials against a background of changing regulation, policy, and market forces, as well as increasing pressure on the environment, soil quality, and food production. More information [here](#).

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