



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA
DIPARTIMENTO DI
SCIENZE E TECNOLOGIE AGRO-ALIMENTARI

Distal international

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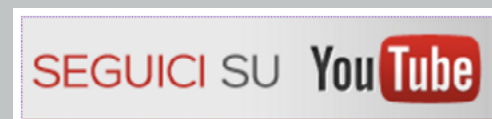
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n° 1 - 2021



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Dipartimento
di Scienze e Tecnologie Agro-Alimentari
ALMA MATER STUDIORUM
Università di Bologna

DISTAL NEWSLETTER GOES INTERNATIONAL

Author: [Davide Viaggi](#)



Yes, the DISTAL newsletter goes international!

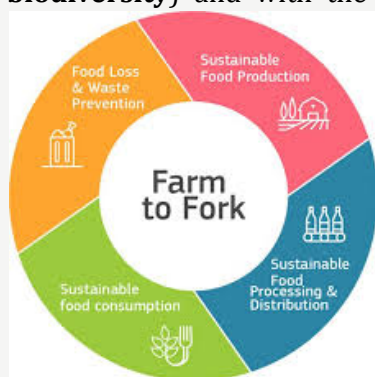
We are excited to bring to you the first issue of the English version of the newsletter of the **Department of Agricultural and Food Sciences (DISTAL)** of the **University of Bologna**.

DISTAL is not new to an international audience. On the contrary. With **79 active EU projects in 2021** and being one of the best performing areas of UNIBO in the international rankings (**44th position in the Agriculture and Forestry subject of the QS ranking**), DISTAL is widely networked in international research.

This newsletter is a further step forward in strengthening our connection with the international audience and with hundreds of institutions that are currently collaborating with us in research, education, and knowledge exchange. The newsletter will be published twice per year.

The first issue is just an example of the width and diversity of current **challenges and opportunities in and from research**. Showcased examples touch issues ranging from genomics to packaging, from molecular devices to climate change and the Bioeconomy.

This comes not by chance at a turning point of the history of our countries, with the implementation of the **Green Deal** and of several related strategies (such as **farm to fork, biodiversity**) and with the launch of **Horizon Europe**



(the new EU research program). This, combined with the beginning of the recovery from COVID-19 towards the “new normal”, is expected to lead to a **new and challenging era for research**. The same applies for education that is undergoing a revolution of instruments and approaches. And both are embedded in a renewed dialogue with industry, public institutions and society as a whole.

This newsletter aims at contributing to these dialogues and transitions. So, do not hesitate to get in touch for feed-back, opinions, and proposals for collaborations. We are looking forward!

Horizon Europe



CLIMATE CHANGE AND MIGRATION: WHAT RELATIONSHIP? THE EU PROJECT #CLIMATEOFCHANGE EXPLORES THE NEXUS

Authors: [Elisa Iori](#) & [Matteo Vittuari](#)



#ClimateOfChange is a EU funded project led by the [NGO WeWorld-GVC](#) that focuses on the complex nexus between climate change and migration. The University of Bologna coordinates the research element of the project with an interdisciplinary team from four different departments: **Agricultural and Food Sciences**, History and Cultures, Political and Social Sciences, and Sociology and Business of Law.

The research aims at contributing to the theoretical models and empirical evidence on the change/migration nexus with the results from case studies: **Senegal, Guatemala, Kenya, and Cambodia**. Both quantitative (surveys) and qualitative research tools (focus groups, interviews, climate diaries) have been used and adapted to the new post Covid-19 era in which the possibility of conducting ground empirical investigation is highly affected. **Climate change can be perceived as a threat multiplier of pre-existing vulnerabilities**, such as poverty, lack of resources, food insecurity especially for those living in rural areas. **People working in the agricultural sector suffer the impacts of climate change the most**, due to lack of infrastructure and low adaptive capacities in rural areas. Individuals who drop out from pastoralism and agricultural activities because of environmental crises (like drought and floods) are more prone to become climate-induced displaced people, as a consequence of the lack of resilience and structural mechanism to prevent people from abandoning their rural activities.

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Keur Balla, Louga, Senegal. Ph: Elena Giacomelli



Indeed, the overwhelming majority of environmentally induced migratory movements are internal, a number may be regional, but very few are towards the Global North.

Aside from natural disasters, climate change can be perceived as interconnected with other reasons to migrate with the decrease and general lack of opportunities in land use and rural activities. Guatemala and Senegal field works have been concluded, while research in Cambodia is ongoing and field work Kenya is planned for November 2021. Research results will feed into the awareness

raising, campaigning and advocacy elements of the project ensuring that activities are grounded upon robust research findings.

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MEASUREMENT AND MODELLING OF DIELECTRIC PROPERTIES OF ANTARCTIC ICE

Author: [Marco Bittelli](#)



The polar regions are the first and fastest areas affected by anthropogenic climate change, and the consequences of such effects, such as the dramatic reduction of the polar ice cap, have repercussions on the global climate.

To understand the mechanisms that influence the global climate, we must therefore observe and monitor the entire geographic extent of the polar regions, including Antarctica. Due to the vastness of these regions, extreme weather conditions and remoteness, satellite remote sensing is a unique tool for estimating the mass balance of the polar ice cap.

The availability of new microwave space sensors has further stimulated investigations, allowing the deeper layers of the ice sheet to be explored. However, to improve remote

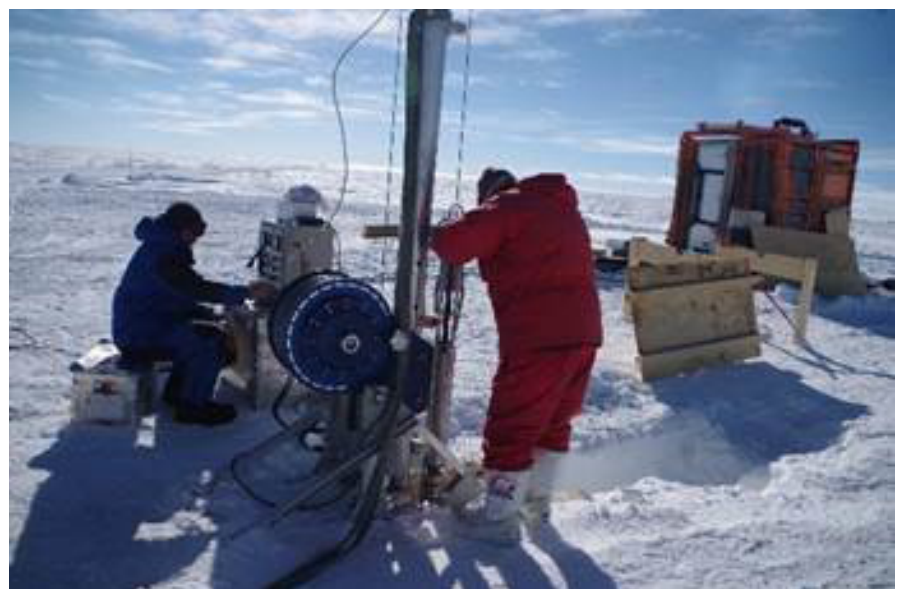
sensing measurements, corresponding *in situ* measurements of the electromagnetic characteristics of ice are needed to calibrate and validate satellite data.

Our project, “Dielectric Characterization of the Antarctica Polar Cap from Perforation at Dome-C”, funded by the Italian Ministry for Education and Research (MIUR), within the National Projects for Research in Antarctica (PNRA), is a multi-year project aiming at collecting ice cores and measure its dielectric properties through dielectric spectroscopy.

For the first time, in our research (recently published in the journal *Cold Regions Science and Technology*, <https://www.sciencedirect.com/science/article/abs/pii/S0165232X21000355>) a detailed measurement of both the real and the imaginary part of the dielectric spectra was obtained.

These novel data allow for characterization of the variation of dielectric properties with depth and to develop physical models of the interactions between density, crystal structure and depth.

This information is key to correctly quantify, from satellites, the thickness of Antarctica sheet.



EVERY BEE MATTERS: A PROJECT TO MONITOR THE HEALTH OF AGRICULTURAL ENVIRONMENTS WITH BEES

Author: [Fabio Sgolastra](#)



Honey bee (*Apis mellifera*) is a social bee species characterized by large perennial colonies. In each colony, there is one queen (the only fertile female), several hundred males (drones), and many thousands of sterile females (workers). From February to November, a single honey bee colony can visit billions of flowers from different plant species in a very large area (1.5 km on average). On the contrary, **mason bees** are solitary bees of the genus *Osmia* that nest for ca. 2 months from February to May, depending on the species and the geographic area. Each female builds and provisions her nest (usually in above-ground cavities) and raises her offspring alone, with no cooperation from other individuals. Mason bees visit a limited number of plant species in a small area, usually 100-200 meters from the nest.

Every bee matters is a recently launched national project funded by the Italy's largest food retailers (COOP) with the scientific support of DISTAL - University of Bologna and the collaboration of LIFEGATE, a consulting and media company, and CONAPI, the largest national beekeeper consortium. Starting on May 2021, this three-year project aims to monitor the quality of the agri-environments using bees as bioindicators and foster the adoption of sustainable practices among farmers. The ecological sustainability of Italian orchards in more than 30 farms will be monitored by assessing the risk from pesticides and landscape management on honeybee colonies and mason bee populations. The project is highly innovative because it uses two bee species with complementary life-history traits as bioindicators of agricultural environment.

In the project, the pollen collected by the two bee species during orchard bloom will be collected and analyzed to evaluate pesticide contamination and plant diversity in relationship with landscape management. Integrating data from these two "monitoring systems", we expect to have an overall picture of the health status of the agricultural environment in Italy and to identify the best bee-friendly practices. In addition, a complementary communication plan has been put in place to increase public awareness of the importance of bees for human life.



MECHANICS OF THE INFINITELY SMALL: NANOGEAR, TOWARDS A MOLECULAR GEAR

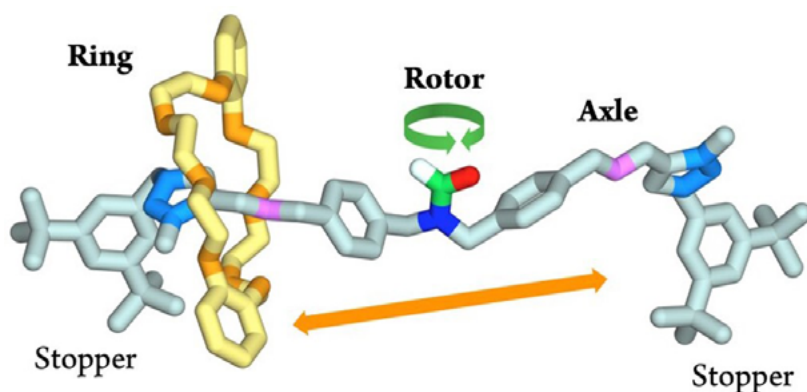
Author: [Massimo Baroncini](#)



The realization of **motors of molecular size** is one of the most significant achievements of chemistry in the past three decades. NanoGear is a nanoscale mechanical device constituted by interlocked molecular components and designed to function as a gear. Since molecules are nanometric objects, it is an exceedingly small device: certainly, the tiniest gear ever produced in the Italian land of motors. Nowadays it is widely acknowledged that the transmission and transformation of nanoscale movements are the basis of the major functions of living organisms. Nevertheless, these phenomena are poorly understood in artificial molecules because they are difficult to replicate and identify.

NanoGear is constituted by three key components: a ring encircling an axle that is linked in the center to a rotor. The ring is free to shuttle along the axle, but it cannot escape because two bulky groups (stoppers) positioned at the ends of the axle prevent it from slipping off. The rotor is free to rotate around its axis and has two different 'blades' to facilitate observation of the movement.

Sophisticated nuclear magnetic resonance techniques enabled to observe that at 60°C the ring shuttles from one end of the axle to the other about 7 times per minute, passing over the rotor; in the same amount of time, the latter completes about 260 rotations. Therefore, the two motions are not synchronized; however, they mutually influence each other as evidenced by comparison with model compounds. A significant and unexpected characteristic of NanoGear is that in polar solvents the rotation of the rotor is slowed down while the shuttling of the ring is accelerated. Such a 'specific lubrication' finds no correspondence in the macroscopic world and constitutes one striking example of the unconventional properties, peculiar to nanodevices. This unanticipated result, obtained in collaboration with [Stefano Corrà](#) and [Alberto Credi](#) of the University of Bologna (major details @ [Stereodynamics of E/Z isomerization in rotaxanes through mechanical shuttling and covalent bond rotation. Corrà, de Vet, Baroncini, Credi, Silvi \(2021\) CHEM](#)), demonstrates how making and studying artificial molecular devices such as NanoGear are crucial to improve our understanding of molecular motion at the nanoscale. At the same time, NanoGear represents a step forward in the long-term goal of developing ultra-miniature mechanical devices with potential breakthrough applications in **various fields of technology**.



GREAT LIFE: A RESILIENT AGRICULTURAL APPROACH TO FIGHT CLIMATE CHANGE

Author: [Giovanni Dinelli](#)



Climate change, especially warmer and drier weather, negatively affects crop production and threatens future food supply. This threat can be alleviated through the implementation of appropriate adaptation measures. To face climate change, **GREAT LIFE project** (2018-2022) proposes to develop methodologies and tools under organic farming for the **progressive replacements of traditional water intensive crops with more resilient summer crops**. To generate positive and sustainable change, GREAT LIFE actively involves the entire supply chain, from farmers to processors to final consumers. The bottom-up and participatory approach allows to reduce risks of failure and easily extends the project results to other Italian and European Regions.

GREAT LIFE works at three different levels: **Agriculture**. GREAT LIFE promotes the substitution of maize with more resilient crops, millet and sorghum and the adoption of sustainable agricultural practices, as low-input agricultural models and rotation schemes, according to the principles of conservative agriculture and regenerative organic farming to contribute to reduce direct and indirect CO₂ emissions. **Food**. GREAT LIFE works to identify the best way to transform raw materials in final products both at the level of food industry and at the level of a small or medium-sized food processing companies. The project also experiments with the introduction of resilient foods in the public service of school canteens and is opening discussion tables with institutions to ask for the recognition of "resilience" as a minimum environmental criterion within Green Public Procurement (GPP). **Community**. As the success of the project is deeply connected to the ability to sustain the request of GREAT's products, the project planned activities of listening, involvement, and engagement of the population to generate a community of people that believes in the value of the food as protection of natural resource, the environment, and the health.

Preliminary results suggest that millet or sorghum are better adapted than maize to rainfed organic farming conditions and their higher and more stable yields observed, confirm their role as a sustainable alternative to maize for future climate changing scenarios. The most relevant result of the project is the market launching of a millet and sorghum-based biscuit, prototyped during the project, by Alce Nero, leading organic food company in Italy and partner of the project. The future perspectives are to consolidate and expand the model of sustainable production and consumption developed by the project at national and European level as a useful strategy to contribute to achieving the goal of climate neutrality by 2050.

For further information, please, visit: [GREATLIFE website](#) and [GREATLIFE FB group](#)

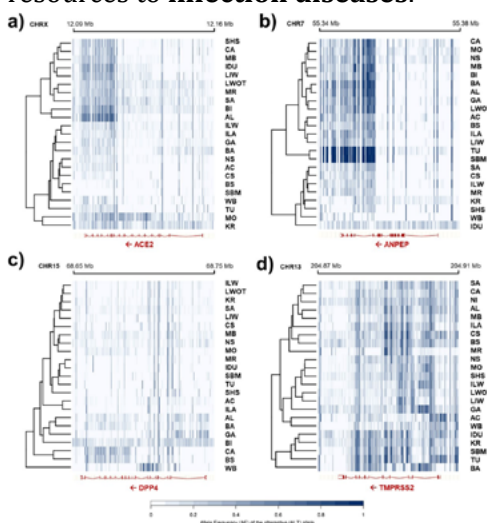


LIVESTOCK GENOMICS IN ONE HEALTH APPROACHES

Author: [Luca Fontanesi](#)



Many animal species can act as reservoirs of viruses. Epidemiological and biological characteristics of several viruses, including their ability to easily cross species barriers, suggest that animals that live in close contact to humans should be considered as a part of a global control strategy in a **'one health' approach** to evaluate if they could represent a risk source of infections for humans and vice versa. Studies in humans and other animal species have demonstrated that the host genome (e.g., variants in the virus receptor genes or other genes that are normal components of the animal genome) might confer different levels of resistance or susceptibility to viral infections. Therefore, variability in the genome of livestock species, which differentiates breeds and populations, can be mined to define **potential genetic risk factors** related to the susceptibility of different animal genetic resources to **infection diseases**.



This general background is the foundation of three projects that have been funded to the **Animal and Food Genomics Group** of the Department of Agricultural and Food Sciences (University of Bologna). [VirAnimalOne](#), a European Open Science Cloud (EOSC) project, and [AnGen1H](#), a project supported by the European Grid Initiative (EGI), that I am honored to lead, are focused on massive data mining of Terabytes of genomic data available in the main farm animal species to predict and monitor **novel virus potential genetic factors** of the host species genomes. [Livestock-Stop-Covi](#), another project funded by Regione Emilia-Romagna, includes **environmental genomic approaches** and analytical genomic methods to **prevent and monitor zoonoses**. These projects made it possible to develop new bioinformatic skills and expertise in managing **big data** and construct One Health concepts which integrate animal genome information. The first results of the project have been recently published in [Scientific Reports](#).

ATTIVO: AN INNOVATIVE PACKAGING PATENT FOR THE FRUIT & VEGETABLE SECTOR AND AN OPPORTUNITY FOR LARGE RETAILERS

Author: [Rosalba Lanciotti](#)



ATTIVO packaging ([technology patented](#) by the University of Bologna) is the result of years of investigation by the research group (mainly [Francesca Patrignani](#) and [Lorenzo Siroli](#)), coordinated by me, and a fruitful synergy with the [Bestack consortium](#), a not profit Italian consortium of corrugated cardboard packaging producers. ATTIVO is an innovative packaging solution in **corrugated cardboard activated with natural antimicrobials** that can reduce the food spoilage and improve the safety of fruit and vegetable products through the inhibition of spoiling

and pathogenic microorganisms. It is a packaging aimed at improving quality, shelf-life and safety of fruit and vegetable products and, consequently, to better satisfy and protect the consumer. The benefits of this innovative packaging have been extensively studied, even with large-scale trials involving the entire distribution chain, and demonstrated on numerous products including strawberries, peaches, nectarines, apricots, grapes, cherries, and raspberries.



ATTIVO has received several awards, including the companies first prize **NON SPRECCARE 2019** (meaning: do not waste) of the University Luiss Guido Carli. On the other hand, the inhibitory effect towards the main spoilage agents makes ATTIVO also an **ecological and environmentally friendly packaging** because it can contribute significantly to reduce food losses and environmental impact.

Globalization has undoubtedly expanded the opportunities, both for the fruit and vegetable sector and for the consumer, but it has posed new and very tough challenges, as we have tragically experienced during COVID-19 pandemics. The presence in ATTIVO of natural antimicrobials, also effective against pathogenic microorganisms, may be a sustainable packaging option that reduces the environmental permanence of many food-borne pathogens and the contamination of the packed food.

A first research study on the persistence of Sars-CoV-2, conducted by the groups of **Food Microbiology** (R. Lanciotti, F. Patrignani, L. Siroli, [L. Vannini](#), [G. Braschi](#)) and **Food Technologies** ([M. Dalla Rosa](#), [P. Rocculi](#), [S. Romani](#),



[U. Tylewicz](#)) of DISTAL and **Microbiology** ([V. Sambri](#), F. Taddei, [T. Gritti](#), L. Grumiro) of the Department of Specialized Medicine, Diagnostics and Experimental has synergized the interdisciplinarity of the University of Bologna, demonstrating how ATTIVO is **able to accelerate the disappearance of COVID19** from the packaging surface even when inoculated at high levels.

ATTIVO also represents a good strategy to reduce the persistence of viruses including Sars-Cov-2 in the environment and potential cross contamination of air/surface/people. These important characteristics of ATTIVO patent have favored in recent years its spreading in the large-scale distribution of fruit and vegetable products and its use by operators attentive to consumer satisfaction, the protection of the environment and the sustainability of food products. Currently it is used by four important Italian distribution chains for the commercialization of strawberries, peaches, nectarines, apricots, and small fruits.

Project DAMR – A CHANCE OF VIRTUAL MOBILITY FOR STUDENTS & RESEARCHERS

Author: [Frederique Pasquali](#)



Disseminate AntiMicrobial Resistance knowledge and the use of whole genome sequencing on relevant bacterial pathogens during COVID-19 world emergency (DAMR) is a one-year project, which started the 1st of April and was funded by *seed funding UNA EUROPA -European University Alliance*. The consortium includes DISTAL as coordinator and Freie Universität Berlin (FUB), Universidad Complutense de Madrid and Helsingin Yliopisto (The University of Helsinki) as partners. The Central Hospital of Bolzano, the Free University of Bolzano and the University of Pavia are involved as third parties.

The objective of the project, in these days of COVID-19 emergency, is to promote virtual mobility formats to overcome physical distances and help social proximity of students and researchers working at the Universities of the consortium. These formats will be used to disseminate knowledges on antimicrobial resistance (AMR) and whole genome sequencing (WGS). These topics will contribute to shape the present and future professionals who will have to face AMR, one of the greatest challenges for public health. In details, during the academic year 2021/2022, students will have the opportunity to access to joint teaching Units (JTUs). Each JTU consists of a recorded video presentation, and an on-line live session of questions and answers in which students can directly interact with the author of the video. Moreover, students will be involved in an on-line survey for the evaluation of their awareness and preparedness on AMR. This survey will be useful to shape future syllabi on this topic. Finally, beyond activities of education, DAMR foresees research activities aiming at comparing and sharing bioinformatic pipelines for the analysis of sequenced genomes of antimicrobial resistant bacteria.

DAMR is one of the UNIBO projects funded by UNA EUROPA. For additional information on UNA EUROPA -European University Alliance and their projects/initiatives, please, visit the [website](#).

For further details, please, contact [Frederique Pasquali](#) (DAMR project coordinator) at frederique.pasquali@unibo.it





**Follow up -
32ND ANNUAL
MEETING AAIC
- INDUSTRIAL
CROPS &
PRODUCTS
UNLOCKING
THE POTENTIAL
OF BIOECONOMY
(September 5-8,
2021, Bologna, IT)**

by [Federica Zanetti](#)

The 32nd AAIC annual meeting has been held at the [DISTAL](#) (University of Bologna). The Association for the Advancement of Industrial Crops ([AAIC](#)) is an international, nonprofit educational and scientific organization established to encourage and promote the activities on industrial crops, that are utilized for non-food and non-feed applications, and products. These plants provide raw materials and products such as energy, starch, oils, fibers, and rubber that are used in different industries. It was the third time that the annual meeting was organized in Europe, since its start.

More than 120 people, from academia, industry, national and international government, attended the meeting, either online or on-person. A field trip was organized in the opening day at the University Experimental Farm in Cadriano. Then, the plenary session opened scientific sessions of the AAIC meeting, gathering eminent experts from Italy, Europe and overseas, who presented the opportunities and the policies for the **future development of industrial crops and products**.

In particular:

- **Fabio Fava**, from the University of Bologna, reported the future strategies of the public and private partnerships in the European Biobased economy;
- **Nicola Di Virgilio**, DG Agri EU commission, presented the new Fit for 55 package of support policies to sustain agriculture in Europe;
- **Jack Grushcow**, from Smart Earth Camelina, Canada, presented the work done to transform camelina in an economic oilseed crop for northern America;
- **Alan Garosi**, from Fulgar, presented the new biobased polyester for textile based on castor oil;

- **Giacomo Fanin**, from Cerealdocks, shown their industrial strategy to deploy the potential of industrial crops;

- **Jean Luc Dubois**, from Arkema, presented a cost analysis comparing different vegetable oils for producing biobased chemicals.

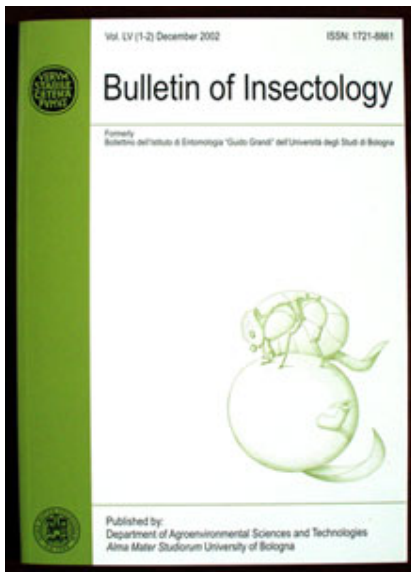
More than 60 oral presentations populated five scientific divisions with speakers from all over the world.

Within the **Oilseed division**, the new oilseed crop camelina was the species having the higher number of studies presented, showing the great interest toward this new crop which has high environmental plasticity and could provide multiple feedstocks. In the **Natural rubber and Resin division**, guayule was the hot topic as this rubber shrub grows well both in Europe and in the USA. The **Medicinal and Nutraceutical crops division** was populated by very interesting presentations showing the potential of several crop species, as biopesticides but also to produce medicines, against different human diseases. The **Fiber and Cellulosic crops division** included presentations also reporting the potential of these species to produce biocomposites and different added-value materials.

As expected, the **General crops division** showed great variability of topics, with woody species and biomass crops, either annual or perennial ones, being the focus of most of the presentations.

The 32nd AAIC meeting, despite the COVID19 situation and the difficulties related to organize a hybrid event, was a real success with large participation and high-quality scientific research presented, showing the potential of **industrial crops in boosting the transition to a green and more sustainable economy**.

EDITORIAL ACTIVITIES



[Bulletin of Insectology](#) is an open access international scientific journal that publishes original articles mainly on morphology, biology, behaviour and physiology of insects and other arthropods, on control of insects, mites and other arthropod pests with particular reference to biocontrol and integrated pest management.

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Managing Director: **Stefano Maini**



[EQA – International Journal of Environmental Quality](#) is an international, multidisciplinary, and peer-reviewed journal that encourages high-quality submissions of original research or brief reviews and analyses dealing with the aspects concerning soil, water and air quality and the sustainable use of these environmental resources.

Policy analyses, regional reports, conference reports and book reviews on the above-mentioned topic are also welcome.

Editors-in-Chief

G. Corti, C. Dazzi, [G. Falsone](#), V. Radim, G. Vianello, [L. Vittori Antisari](#), D.C. Weindorf

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Special Issue
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Guest Editor
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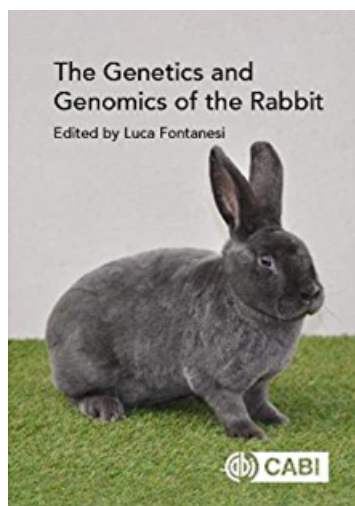
Guest Editors
Prof. Carlo Bibbiani, Dr. Marco Bovo

Deadline
31 December 2021

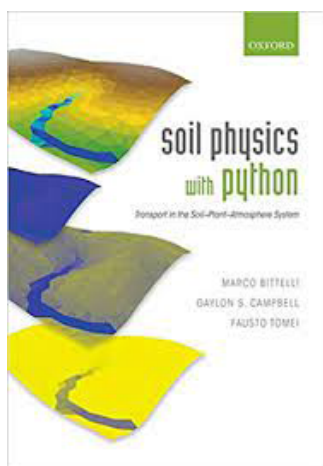
Special Issue
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Publications of DISTAL



Rabbits have many uses - as well as being cherished pets, they are bred for their meat and fur, and as laboratory animals. Understanding their genetics and genomics is key to their production and, equally, to their care, welfare and health. Beginning with an introduction to the rabbit, including key information on their evolution, domestication and breed types, this book then concentrates on the genetics and genomics of this valuable animal. This book covers: - Cytogenetics, genetic maps and QTL mapping; - Immunogenetics; - Genetics of coat colour, meat, fibre and fur production, reproduction, disease resistance and more. Concluding with practical applications such as creating transgenic and genome edited rabbits, biotechnical applications and the rabbit as a biomedical model, this book brings this important topic fully up-to-date. It provides an indispensable resource for animal and veterinary researchers and students, as well as rabbit breeders and laboratory scientists. Edited by [Luca Fontanesi](#).



The prestigious [Japanese Society of Soil Physics](#) has recently published two very positive reviews on the book [Soil Physics with Python: Transport in the Soil-Plant-Atmosphere System](#) (Bittelli, Campbell and Tomei, 2015, 2nd edition, Oxford University Press) and the [website of Marco Bittelli](#).

Prof. Teruhito Miyamoto writes <<the book is highly recommended, especially for undergraduate and graduate students who are starting to learn numerical calculus. Mastering this book will require patience and effort, but I guarantee you will be more than rewarded. Furthermore, I hope that the knowledge from this study will be used to create codes and solve new problems>>.

Prof. Koji Kameyama writes <<the website lists and downloadable numerical codes to solve a wide range of problems in soil physics. On his research page, he lists the research projects he has been involved in at different times, which shows that he has worked on a wide range of soil physics topics. Please review them if interested>>.

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