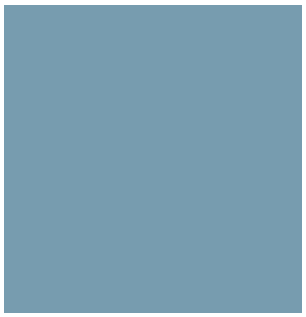
RAIZ

Forest and Paper Research Institute



2019 ANNUAL REVIEW

CONTENTS

PAGES

01 KEY PERFORMANCE INDICATORS

PRIVATE FUNDING	7.1 M€	126	PROJECT DELIVERABLES
PROOFS OF CONCEPT	52	2.4 M€	PUBLIC FUNDING
NEW POTENTIAL BUSINESSES	4	2620	OUTREACH INITIATIVES (PEOPLE INVOLVED)
PUBLICATIONS	33	9	PATENTS

02

OVERVIEW 2019

RAIZ grew and consolidated in 2019. The recognition as a Business Innovation Center (BIC) and as an Interface Center (awarded in 2018) and the access to the Multi-Year Base Program financed by the National Innovation Agency, were decisive in consolidating the team, the **RAIZ** areas of competence and its laboratory infrastructures, specially in delivering qualified services.

Due to the strategy of diversifying financing sources, including direct contract work with companies, in particular with **THE NAVIGATOR COMPANY**, **RAIZ's** main associate, as well as through competitive public funding (National and European), **RAIZ** has achieved an adequate balance of its activity. Answering, on one hand, to the short-medium term needs of the forestry sector and the national pulp and paper industry, and, on the other hand, in creating knowledge which allows responding to the medium-long term challenges of these sectors, taking into account the global changes that we're observing.

RAIZ is committed to contributing to a more sustainable planet, where forests and renewable resources play a decisive role. In this context, the inpactus project stands out, as the largest investment made in Portugal in R&D in a consortium in the area of forest products, which is currently in its second year of execution, and is led by **The Navigator Company** and **RAIZ**.

THE ACTIVITY DEVELOPED IN 2019, PURSUED THE FOLLOWING GENERIC OBJECTIVES:

- **to increase forest productivity**, while based on internationally recognized sustainability criteria;
- **to promote the transfer of knowledge** to third parties, particularly in the forestry area;
- **to increase the sector industrial and environmental performance**, associated with the efficient use of resources (wood, water and energy, in particular) **and the implementation of the circular economy principles;**
- **to promote paper products differentiation** and the competitiveness of the National industry;
- **to develop new paper materials and bioproducts** from wood and biomass, in the context of the emerging forest-based biorefineries;

With adequate physical resources and highly qualified and motivated people, the results, and their direct or potential impact on the sector economy appear, as demonstrated, very succinctly at this **Annual Review**. The 9 patents submitted in 2019 and the 33 scientific papers presented, are just the most visible face, of an otherwise broad team work that involves not only **RAIZ** collaborators but all the academic partners we work with, as well as practitioners in many operational areas (forest, industry and commercial area). **To all, our sincere thanks for the dedication to this Institute… and to the causes and values we stand for!**

ADRIANO SILVEIRA
Chairman

CARLOS PASCOAL NETO
General Director

03 INPACTUS PROJECT

A step forward to a green, global, sustainable and competitive bioeconomy in Portugal, based on eucalyptus pulp-and-paper industry

The **Inpactus Project** - Innovative Products and Technologies from Eucalyptus, developed by the Navigator Brands Consortium, Navigator Pulp Aveiro, **RAIZ**, University of Coimbra and University of Aveiro and by the partners (subcontracted entities), Universidade NOVA de Lisboa, Instituto Superior Técnico, University Beira Interior, University of Minho, Satisfibre, Rise Innventia, Fraunhofer and International Iberian Nanotechnology Laboratory, involving an investment of around 15 M € (4 years) since its beginning (February 2018) has been promoting the project support infrastructure consolidation (acquisition of scientific and technological equipment), the advanced training of its researchers, as well as the development of innovative solutions and products, in the context of a forest-based Bioeconomics.

THE MAIN GOALS ACHIEVED IN 2019 ARE:

- the completion of the acquisition and installation of infrastructure in support of R&D activity (scientific and technological equipment), in the amount of 2.2 M €;
- the conclusion of the Thesis Project (1st year of doctorate) of 20 doctoral students involved in the project;
- 33 publications in scientific journals and presentations at congresses;
- submission of 9 patents;
- implementation of "Invited Navigator Chairs" at the University of Coimbra (Prof Thadeus Maloney, Aalto University, Finland) and at the University of Aveiro (Prof Falk Liebner, Boku University, Austria).

The technical-scientific execution had no significant deviations from the forecast.

From the point of view of technical and financial execution, two reimbursement requests were concluded with an incentive value in excess of 2.5 M € and with the refund of 80% of the incentive by COMPETE, related to the first reimbursement request, in December 2019, in a total amount of 916 K €.

Co-financed by:
COMPETE 2020
PORTUGAL 2020
UNIÃO EUROPEIA
Fundo Europeu de Desenvolvimento Regional

THE FOLLOWING MAIN DEVELOPMENTS OF 2019 IN THE AREAS OF R&D OF INPACTUS CAN BE HIGHLIGHTED:

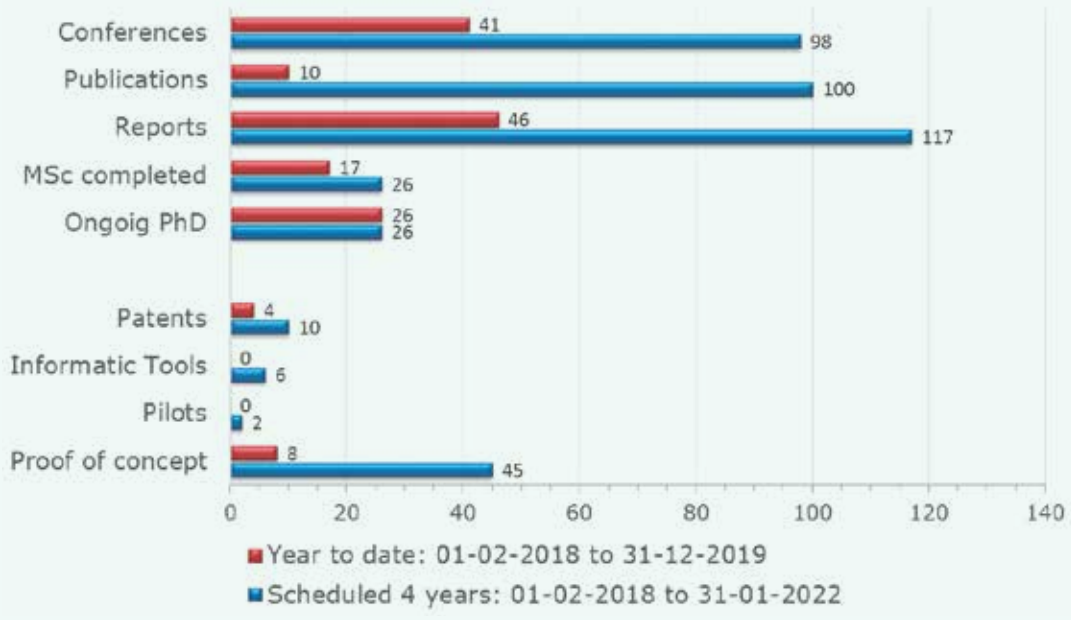
In the **Pulp area**, wood of different species was evaluated for the production of kraft pulp and the conditions, specific consumption and paper properties resulting from mixtures with *E. globulus* were compared. Enzymes and bleaching conditions were tested with an effective decrease in chemical consumption. Still in this area, tools for supportting the reduction of water consumption and innovative technologies to mitigate phosphorus and organochlorine compounds in effluents are being developed.

In the **UWF Paper area**, the proof of concept of a paper with luminescent properties for counterfeit detection applications in cellulosic matrices was carried out as a guarantee of security and authenticity, and a provisional patent application was prepared. The incorporation of different microfibrillated celluloses in bleached kraft eucalyptus pulp resulted in an increase of laboratory sheets resistance. The National and International patent applications were submitted and a scientific article published. Innovative surface treatments were selected and started.

In the **Tissue area**, microcapsules of renewable origin were produced for bioactive compounds and additives, and enzymes and conditions for improving Tissue properties were evaluated. The incorporation of raw kraft pulp and kraft pulp from *E. globulus* bark on Tissue paper was tested, producing prototypes and evaluating the effect on properties, and 2 provisional patent applications were submitted on this topic. A model was also established to optimize the constitution of cargo on pallets and trucks.

In the **area of Bioproducts and Biorefineries**, the highlight was obtaining extracts of forest biomass, sequentially, from essential oils to extracts with relevant biological activity. Cellulosic sugars were produced from pre-treated biomass by different processes, using different enzymes, evaluating their potential for bioethanol production. From sugars, bacterial cellulose was also produced, which revealed properties of interest in the food industry and, also in this case, led to the preparation of a provisional patent application. Strategies were developed to obtain xylan derivatives of interest to the food and cosmetic area, from bleached eucalyptus kraft pulp, leading to the preparation of a provisional patent application. New materials from lignin and cellulose had developments in 2019, notably the production of soluble derivatives from these materials.

INPACTUS: PERFORMANCE INDICATORS



04 RESEARCH, DEVELOPMENT AND CONSULTING

INDUSTRIAL PROCESSES AND PRODUCTS

RAIZ's Technological Research and Consultancy activities are essentially aimed at supporting **The Navigator Company,** in implementing its strategy of continuous improvement of processes and products, in improving its environmental performance and in implementing its Sustainability Policy.

THE FOLLOWING TOPICS STAND OUT:

- implementation of capacity increase projects, or procedural changes, contributing to the selection of the best technologies available on the market, through the monitoring of the previous phase and the start of the technological changes introduced, monitoring the critical process variables, performance of equipments and the diagnosis of non-conformities;

- optimization and reduction of utilities and raw materials consumption, in the pulp and paper production process, with special emphasis on the use of water and improvement of wood consumption;

- continuous improvement of the quality of non-coated printing and writing (UWF) pulp and paper and tissue products, and development of new products in accordance with **THE NAVIGATOR COMPANY'S** diversification strategy;

- development of initiatives with different partners, Universities, Companies and Suppliers, with a view to reduce and value the waste generated by **THE NAVIGATOR COMPANY**, contributing to the implementation of new strategies that allow the incorporation of this waste as raw materials for other products with greater added value;

- search for opportunities within the scope of the implementation of the bio-refinery concept in **THE NAVIGATOR COMPANY'S** Industrial Complexes, taking advantage of the existing synergies with the current business models, investigating new applications for the products of the eucalyptus forestry sector, and of the products and by-products that the Company already produces today;

- participation in national and European research projects, with Academic Partners, Companies and Suppliers, in order to generate new knowledge for fundamental business areas , development of new products and / or processes.

MAIN HIGHLIGHTS OF 2019

REDUCED WATER USE IN THE PROCESS

Aware that the rational use of water is one of the biggest challenges facing **THE NAVIGATOR COMPANY** at the moment and continuing the work developed by **RAIZ** in this area, a complete assessment of the use of water was made at the Figueira da Foz Industrial Complex, as well as diagnosis and proposed reduction measures. **RAIZ** also provided technical support in the study and implementation of reduction measures in the Industrial Complexes of Aveiro and Setúbal. Together with the operational teams, it followed the specific implementation of the measures identified, proving its expected impact on water use in the different Industrial Complexes.

Due to the direct relationship between water and effluent flow and growing environmental concerns, scenarios were developed to forecast the impact of reducing water use in conjunction with programmed changes in pulp and paper production processes, in the concentrations of final effluents.

IMPROVING ENVIRONMENTAL PERFORMANCE

The revision of the AOX discharge environmental licenses and the criteria for the award of the eco-label for tissue paper, led to an extensive work of identification, selection and comparison of the various technologies available for AOX reduction and removal, with a view of adapting the industrial process to the new emission limits, which has been fully achieved.

CIRCULAR ECONOMY

Industrial tests carried out at the Figueira da Foz Industrial Complex have made it possible to recover a significant percentage of the primary sludge fibers generated in the pulp and paper production process. The amount of fiber generated in this industrial test allowed incorporation tests on potential end users to be carried out, in which no adverse impacts of their incorporation were observed either on their production processes or on the properties of the final product. This demonstrated the technical viability of the tested solution. In addition to this activity, **RAIZ** supported The Navigator Company, seeking to minimize the generation of waste and seeking new uses for these materials.

WOOD AND IMPACT ON THE PROCESS

The continuous monitoring and forecasting of The Navigator Company's specific wood consumption provides relevant information for identifying compliance with the values established in the budget and for defining it for the following year. The realization of a new campaign of wood losses in the wood parks made it possible to update and strengthen the quality of the data that support the forecasting and measurement model of specific wood consumptions developed in **RAIZ**, allowing to include each Industrial Complex in this modeling, hence quantifying the impact of changes already implemented or identify potential improvement measures to be implemented.

CAPACITY INCREASE OF THE FIGUEIRA DA FOZ INDUSTRIAL COMPLEX

The collaboration and continued work between **RAIZ**, the Figueira da Foz Industrial Complex team and several suppliers, made it possible to optimize the procedural conditions that resulted from the conversion of the pulp production process to LoSolids ™ Technology and Oxygen Delignification. The intense laboratory and field work carried out, led to the identification and implementation of procedural changes that allowed in 2019 to consolidate the knowledge and mastery of this new pulp production process.

PULP AND PAPER: INCREASED MECHANICAL STRENGTH

Using new approaches, the improvement of the mechanical strength of pulp and paper was investigated, through the study of the physical-chemical interactions of functional additives with eucalyptus pulp. Some of the results obtained allowed industrial tests to be carried out, with a view of verifying on an industrial scale, the results obtained.

PULP AND PAPER: NEW PRODUCTS

The search for alternative applications for eucalyptus fiber, culminated in the development of a PhD plan by a Researcher from the **RAIZ** Institute in collaboration with the University of Coimbra and the University of Aalto, from Finland, in which it is intended to investigate and maximize the potential of eucalyptus fiber for the production of paper suitable for 3D shapes, improving its foldability / conformability.

MICROFIBRILATED CELLULOSE

The impact of several Microfibrillated Celluloses, produced by various processes, from bleached eucalyptus pulp was the object of characterization and study, having evaluated the impact of the different celluloses on the properties conferred to the paper on a laboratory scale.

PRODUCT DIFFERENTIATION: UNCOATED PRINTING AND WRITING PAPER

Contributing to the improvement of the uncoated printing and writing paper (UWF) produced by **THE NAVIGATOR COMPANY**, support was given to the implementation of changes to the production process in order to provide its differentiation in the market, as well as developments of competencies in the diagnosis and support to the production line of this type of paper.

PRODUCT DIFFERENTIATION: TISSUE

The assessment of the impact of functional additives and other approaches to their incorporation are also part of the extensive work carried out to improve the quality of tissue paper. For this purpose, **RAIZ** took the lead in the development of some tissue products, which is expected to carry out industrial tests in the course of 2020 in order to continue the promising results obtained to date. The development of new packaging concepts was also an activity in which **THE NAVIGATOR COMPANY** had the involvement of **RAIZ**.

CONSORTIUM R&D PROJECTS

PROTEUS (P2020)

2019 marked the conclusion of the **PROTEUS** project. In this project it was demonstrated that the most promising applications for the inorganic waste generated in the pulp production process are mortars and clinker with final properties suitable for the construction sector.

The production of biochar, as a fertilizer additive, from biological sludge has also been the subject of evaluation.

In the field of mitigating AOX emissions, advanced oxidation processes were evaluated, such as, for example, electrocoagulation and the Fenton process.

SHELLUTION (P2020)

The **SHELLUTION** project intensified its activity in 2019. In this project it is intended to develop new mineral fillers from eggshell residues that provide improved properties to the paper produced. The research focused on the development of these new materials and the study of their paper properties.

LIFE_NO WASTE LIFE EU PROGRAM (H2020)

In this project, mine soils were treated with fly ash and biological sludge, with a decrease of the soil acidity, in addition to an increase in the solubilization of dissolved organic carbon and nutrients, leading to spontaneous plant germination after a few months. Other soil application tests are under way in order to consolidate the results obtained and to evaluate the environmental impact.

PAPERCHAIN (H2020)

The incorporation of some residues from the pulp production process in the construction sector is being demonstrated in the context of this European project. The construction of gantries and the application of bituminous, in the execution of pavements, are objectives of this project. Thus, in 2019 the conditions were met for the circular case in Portugal to be realized in 2020, with the execution of two planned demonstration units.

WOODZYMES BBI (H2020)

Within the scope of this project, bleaching enzymes were tested in order to optimize the bleaching of eucalyptus kraft pulps and kraft pulps of hardwood and resinous blends. The first tests of production of polyurethane foams with polyol based on lignin were also carried out.

FORESTRY

THE RESEARCH AND TECHNICAL SUPPORT AND EXTENSION ACTIVITIES CARRIED OUT AT RAIZ COVER A WIDE RANGE OF TOPICS. THE MAIN ONES INCLUDE:

- a better understanding of the forest functioning in all its production and conservation dimensions (trees and their interactions with vegetation, water, soil and climate), offering practical solutions and measures to mitigate impacts in order to have better and more resilient plantations;

- genetic improvement, with a view of making available new clones and seeds of higher quality, as a result of a continuous program of measurement, analysis and selection of the best individuals. This program includes the application of advanced statistical analysis methodologies and biotechnology and plant propagation tools;

- use of new remote sensing technologies and development of systems for processing this information in order to support a better forest monitoring and management decisions;

- development of more effective prevention and control measures against the main pests and diseases of eucalyptus, including the testing of new natural enemies.

Finally, **RAIZ** has been actively involved with Universities and research institutions in order to strengthen its network of contacts and strategic partnerships. It also provides a range of services and forest extension initiatives, both to **THE NAVIGATOR COMPANY'S** operations in Portugal, Spain and Mozambique, and to several other initiatives to help forest producers and their associations, service providers and society and academia in general.

MAIN HIGHLIGHTS OF 2019

KNOWING, VALUING AND CARING FOR THE PORTUGUESE FOREST

THE NAVIGATOR COMPANY, with the support of **RAIZ**, is developing a digital platform (www.florestas.pt) that aims to become a reference as an aggregator and facilitator of well-founded information on all forests in Portugal. We hope that it constitutes a bridge between the sector and society, regarding the benefits, values and opportunities it generates. The contents are grouped into four sections: Knowing (scientific knowledge available on topics such as climate change, fires, sustainable forest management, rural abandonment, pests and diseases, among other challenges), Valuing (key socio-economic indicators of the forest and its potential in the future bioeconomy), Discover (invitation to discover and live the forest, through itineraries, curiosities, gastronomy, art and culture) and News and Agenda (with the news and events that mark the forest and the sector).

NEW CLIMATE INDEX FOR EUCALYPTUS IN PORTUGAL

Previous methodology was revised and a new map of climate potential for growth and adaptation of the eucalyptus was produced, based on the 1971 to 2000 climatic series. This new index has shown to be a better fit to the observed yields of eucalyptus, compared to other existing bioclimatic indexes. The RAIZ Climate Index is a robust tool to support operational planning, both for the Company and for supporting Certification Groups and Forest Associations.

IN SEARCH OF ALTERNATIVES TO EUCALYPTUS FIBER IN THE MANUFACTURE OF PRINTING PAPER

As part of the Fontes de Fibra project, a survey was made concerning the potential for culture and the availability of wood for a set of hardwoods, which could be integrated with eucalyptus in the production of pulp and paper. A characterization of the most suitable soil and climate conditions in Portugal was also made for some of these species and several tests were carried out with combinations of wood origins. The results showed that some native species have a good potential for industrial use mixed with eucalyptus fiber.

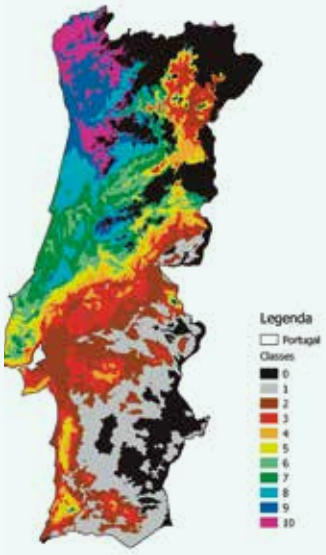
CLOSER AND CLOSER TO FOREST PRODUCERS

RAIZ has been accompanying and technically supporting several Certification Groups that inturn reach out to the forest owners, henceforth supporting the management of their stands. This support includes forest extension initiatives that Navigator Forest Portugal and CELPA have been developing, and highlights the customized support to forest producers (as part of the Premium Program and the Operacionais da Floresta program, both dedicated to training forest service providers).

FOREST EXTENSION IN MOZAMBIQUE

RAIZ has continued to support Portucel Mozambique namely in launching its forest extension program. In this context, a characterization of forest aptitude (soil quality and climate) was carried out in 2019 in areas belonging to four strategic partnerships of the Company, as well as several training sessions on good forestry practices.

New Map of Climatic Aptitude in Portugal



NEW SEED ORCHARD: MORE PLANTS WITH GREATER GENETIC GAIN

Work began on the installation of two new seed orchards, for a total of 10ha. To achieve this, an extensive grafting program was carried out during the year, involving more than 20,000 plants from 2nd and 3rd generation clones. The genetic value of this seed is estimated at 35%, a gain that almost doubles that of the improved seed currently used by **THE NAVIGATOR COMPANY**. In the current orchards, 2019 was a record year of seed harvest, with about 2 kg, which allows the production of 650,000 plants with gains of about 20% in productivity.

MOLECULAR MARKERS IN SUPPORTING THE QUALITY CONTROL OF VIVEIROS ALIANÇA

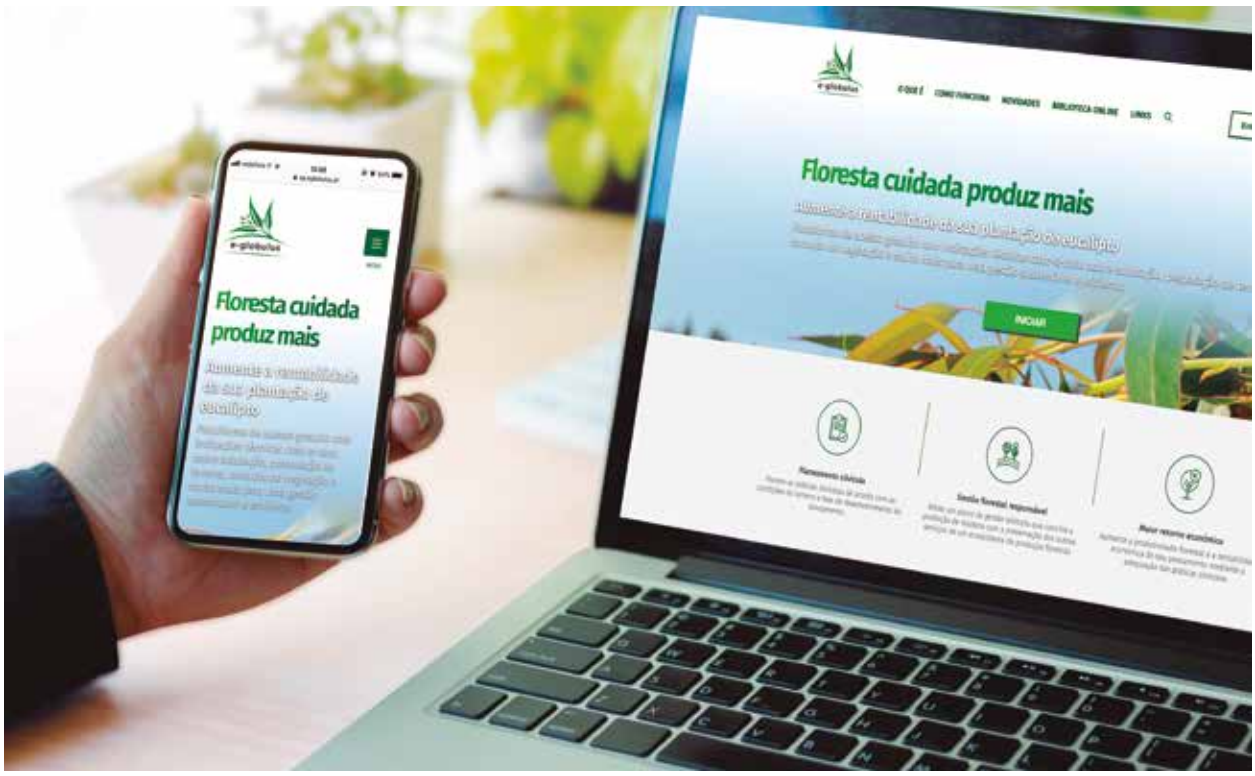
The verification of the clonal identity of the plants in Viveiros Aliança is done by **RAIZ** based on a set of specific molecular markers for clones production. It is being applied to the verification of cuttings sold and to the mother plant yards, in order to monitor and avoid errors of identification or presence of contaminants. This has been a routine activity in the company since 2017. The results point to average values of 4% of identity errors along the production process.

RAIZ IN THE FIRST LINE OF GENOMIC SELECTION

RAIZ joined forces with several world leading pulp and paper companies when deciding to join a crowd funding consortium to develop and share the use of the 65kSNP Axiom marker chip. The project will significantly increase the capacity of **RAIZ** to be able to carry out genomics studies, at low cost and high capacity. In particular, we hope it will allow **RAIZ** to implement a genomic selection strategy in its breeding population, reducing test time and improving selection accuracy.

HYDROLOGICAL MONITORING IN EUCALYPTUS BASINS

RAIZ completed the installation of equipment and infrastructure for detailed hydrological monitoring of two hydrographic basins occupied by eucalyptus. The data that have been collected allows a careful evaluation of the influence of eucalyptus on water resources at the watershed level and thus provides a better understanding of the hydrological responses to different management regimes, under current weather conditions as well as future climate change scenarios.



THE E-GLOBULUS PLATFORM TO SUPPORT THE MANAGEMENT OF THE EUCALYPTUS FOREST IS AVAILABLE ONLINE

The e-globulus platform, a tool to assist the planning of forestry operations aiming at sustainable case-by-case forest situations was developed by **RAIZ**. It is available at www.e-globulus.pt. This project is part of the SIAC programme - Transfer of Scientific and Technological Knowledge, financed by the European Regional Development Fund (ERDF) through the Competitiveness and Internationalization Operational Program (COMPETE2020). This project also resulted in the submission of Portuguese and European patents.

TWO NEW PARASITOID INSECTS TO BE STUDIED IN PORTUGAL

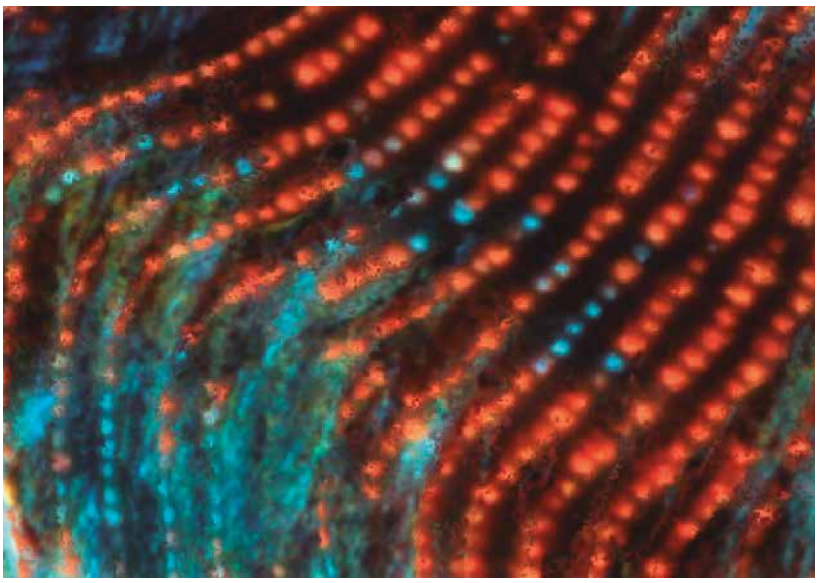
The possibility of being able to release a parasitoid of the bronze bug, Cleruchoides noackae, took another important step forward with the delivery of the formal request to the ICNF for its release in nature. This request comes after a careful assessment of the risks of introduction has been concluded. It showed that they are negligible compared to the potential benefits in pest control. Another natural enemy studied by **RAIZ** includes the host specificity of Anagonia cf. Lasiophthamla. It has enormous potential as a new biological control agent for Gonipterus platensis larvae. A breeding protocol has been produced and the biology of what is a species virtually unknown to science is being unveiled.

CONTROLLING INVASIVE PLANT SPECIES: A FIGHT WITHOUT TRUCE

In order for the company technicians and forest owners to get to know the various invasive plants better and how best to act to control or at least mitigate their effects, **RAIZ** has been carrying out various training actions, in collaboration with the Escola Superior Agrária de Coimbra, the University of Coimbra and the Faculty of Sciences of Lisbon. With particular emphasis, mention should be made of the publication and dissemination of a “Guide for the Identification of the Main Invasive Plants in Eucalyptus”.

REMOTE SENSING IN SUPPORT OF FOREST MANAGEMENT

RAIZ together with other European partners participate in the H2020 *MySustainableForest* project, which has been developing applications to the forest based on remote sensing image, with emphasis on high resolution satellite and LiDAR. During 2019, this project presented promising results for characterizing forestland use, estimated biomass and CO_2 and even wood quality. These project results were presented and discussed with more than twenty entities from the Portuguese forestry sector in a workshop and training session promoted by **RAIZ** in 2019.



05 SERVICES

EDAPHOCLIMATIC STAND ASSESSMENT

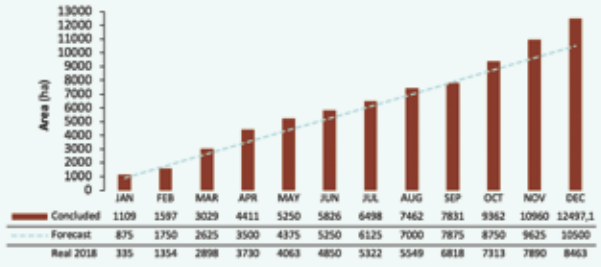
In 2019, **RAIZ'S** forest support services team developed several activities that served as support for the decision making of various clients within **THE NAVIGATOR COMPANY**. Knowing the suitability of the eucalyptus in each location and the expected risks of occurring biotic and abiotic factors is very relevant since if they occur, can compromise the success of the plantation and its normal development. It is a crucial piece also to estimate the future productivity of the forest and anticipate measures to reduce the risks associated with the forest investment decision.

During 2019, an edaphoclimatic characterization (zoning) of 12,500 ha was carried out in Portugal and 2,900 ha in Spain (Galicia and Andalusia).

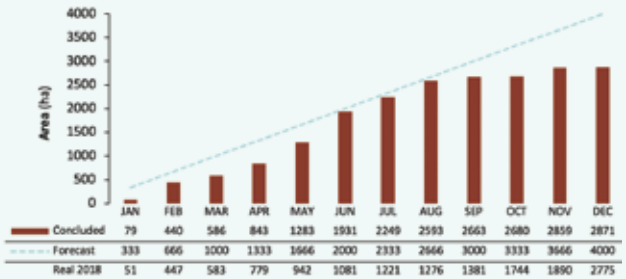
The team was involved in providing technical support to **RAIZ'S** research and development projects, through the installation of new field trials, monitoring of field trials and evaluations of pests and forest diseases.

Several training sessions on edaphoclimatic characterization were held. There was an involvement in the construction and development of a tool that could revolutionize the methodologies currently used to guide land acquisition.

PORTUGAL



SPAIN



LABORATORY

RAIZ has unique research facilities for analytical work and to provide services to the forest and cellulose and paper sector.

THE MAIN SERVICES AND TESTS PROVIDED INCLUDE

- analysis of soil and plant material in support of forestry investment decisions and as a response to the needs of specific forestry research projects;
- analysis of commercial wood samples from new suppliers, and characterization of imported wood supplied to the mills;
- evaluation of the pulp and paper potential of different forest species within the scope of projects taking place in Portugal, Spain and Mozambique;
- conducting benchmarking of tissue products, and critical analysis of commercial products;
- characterization and monitoring of the 4 mills landfills and respective effluents to ensure compliance with environmental licensing.

Furthermore, the NIR (Near Infrared Spectroscopy) models were also strengthened for rapid analysis of wood for determinations of humidity and basic density and forecast of pulp yield;

Finally, in 2019, **RAIZ** made a strong effort to implement new and better methods and optimize operating methodologies with the creation of platforms for the use of equipment. The methods developed include the determination of TC, ICT, TOC, NPOC and DOC in water and wastewater; Determination of Mercury in residues, soils and liquid samples; Analysis of Carbon, Nitrogen and Sulfur in residues, soils and plant material; Determination of impurities Py-GC-MS; Evaluation of the storage time of effluent samples for determining AOX.

A total of 12,500 samples were received and 68,539 results were issued, divided between services (internal and external customers), consultancy and research.

06

NEW POTENTIAL BIOECONOMY BUSINESSES

BIOCOMPOSITES

The market for biocomposites (thermoplastics mixed with natural fibers) has shown consistent and robust growth rates.

Industrial composites groups, as well as P&P companies, have been mentioned in publications and public reports as suppliers of these new materials.

During 2019, **RAIZ** continued to develop/ acquire knowledge for the production of biocomposites with cellulose, conducting production tests on industrial equipment (from external entities), and scheduling others for the 1st semester of 2020. With these tests it is intended to acquire knowledge that allows selecting the most appropriate industrial equipment and developing the product.

Work is also ongoing with companies that supply equipment for concept design and measurement of CAPEXs and OPEXs for an industrial unit.

BIOETHANOL

The new European directive (RED II), which will regulate the incorporation of biofuels in road fuels of member states, between 2021 and 2030, stipulates the obligation to increase by 3.5% the use of advanced fuels by 2030. Cellulosic bioethanol, product identical to the 1st generation (from agricultural crops) already mixed in gasoline, has been considered by oil companies as a viable option, allowing to use the physical structure already available.

At **RAIZ** and **THE NAVIGATOR COMPANY**, the production of cellulosic bioethanol from forest residual biomass was tested in 2019 on a pilot scale, for 5 months, which together with previous R&D knowledge, has supported pre-engineering for a hypothetical industrial cellulosic bioethanol unit, as well as the evaluation of this business model. During the experimental period, hydrolysis and fermentation tests were carried out to test several different conditions of initial deconstruction of the selected biomass.

During the 2nd semester of 2019, relevant steps were taken in the pre-engineering of the industrial unit, work that is expected to be completed in the 1st quarter of 2020.

ESSENCIAL OILS

From the leaves of *Eucalyptus Globulus*, using steam, it is possible to extract essential oils with a high content of cineol / eucalyptol (a compound valued by the cosmetic, fragrance, pharmaceutical and parapharmacy industries). The residual forest biomass burned in the biomass boilers of the national cellulosic pulp mills has a high amount of eucalyptus leaves.

During 2019, work continued to assess the possibility of industrial collection of these oils, with 2 industrial extraction tests having been carried out and another 2 scheduled for the beginning of 2020.

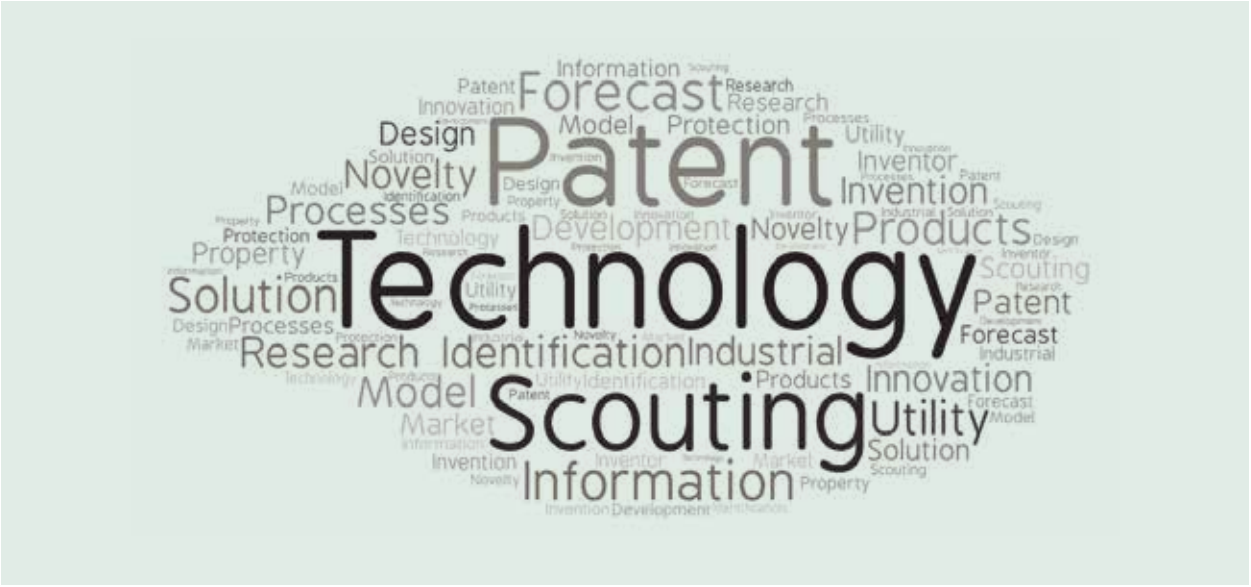
The market for these oils was also evaluated, having identified and made contacts with potential customers. With these developments, the business model is being evaluated.

BACTERIAL CELLULOSE

There are bacteria that have the ability to convert sugars and other carbon sources into high-purity cellulose with nanometric dimensions. In 2019, in partnership with an external company, the scale-up of bacterial cellulose production was carried out and market tests were started in the area of cosmetics and food additives.

07

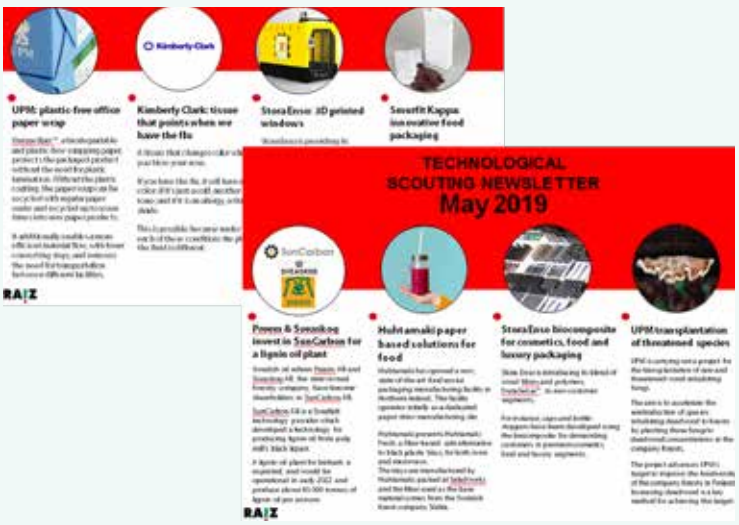
TECHNOLOGICAL SCOUTING AND INDUSTRIAL PROPERTY



In 2019, the regular Technological Scouting Newsletters continued to show how the main players within the Forest, Pulp and Paper and Biorefinery value chains, from Companies, Universities to Research Centers, are working on new processes, technologies and products development.

The monthly Technological Scouting outcomes come along with On-demand Technological Scouting Reports providing support for different **THE NAVIGATOR COMPANY** Departments and **RAIZ** Technological and Forest R&D and Consulting Projects, delivering information on relevant specific technologies, products and processes.

Three Patent Applications were filed to the Portuguese Patent Office resulting from processes and products developed by the technical and forest R&D activities carried out by **RAIZ**, in collaboration with Portuguese Universities partners. Six International and European Patent Applications were submitted, in an effort to extend **RAIZ** patent families portfolio and jurisdiction protection.



08 OUTREACH & SOCIAL RESPONSIBILITY

CONSERVATION EFFORTS

RAIZ is located at **Quinta de S. Francisco,** a unique place on Earth, that combines cutting-edge science in forestry and technology, natural values and an important historical and cultural heritage. This place holds some of the tallest trees in the country (the tallest in the Municipality of Aveiro), true living monuments, the home of one of the most renowned person in Aveiro and the largest centenary eucalyptus arboretum in Europe, with high scientific, ecological or simply scenic value.

Despite its small size, **Quinta de S. Francisco** has multiple diverse habitats, the result from its topography and different floristic occupation, combining more than 400 native and exotic plants species, which support innumerous animal species, including 69 bird species observed so far. All these factors make this place one of Aveiro's green jewels, which RAIZ has the responsibility to preserve.

In 2019 several interventions were made, aiming to protect such valuable heritage, namely contributing to the reduction of forest fire hazards, with the acquisition of a light fire fighting vehicle, used in surveillance operations by the group of volunteers from **RAIZ**. Invasive species control actions, continued, through mechanical and chemical means. Thirty century-old trees were also subjected to maintenance and cohabitation pruning, which contributed to the safety and improvement of the phytosanitary conditions of these specimens. And finally eight new native and exotic species were introduced into the gardens and other parts of the arboretum, contributing to the diversity and habitats richness of this place.

OUTREACH AND DISCLOSURE

RAIZ participated in several round tables (in Lisbon and Aveiro) within the scope of World Soil Day, was present at Expoflorestal de Albergaria, ExpoMortágua, Agrovouga agricultural fair in Aveiro, Techdays in Aveiro and in Tech @ Portugal in Porto.

In 2019, **RAIZ** received 2620 visitors. Among them 2476 visited **Quinta de S. Francisco**, which represents an increase of more than 37% compared to the previous year. Visits were distributed on almost one hundred and half events, in which a total of 228 activities were developed on topics such as the importance of sustainable forests, biodiversity and nature conservation. At the same time, several actions were carried out to raise awareness of forests and the environment in schools, congresses or other events, which made it possible to contact with 980 students.

This disclosure was also made through the publication of 9 news articles and chronicles about the Quinta, its eucalyptus and forests, which appear regularly on the intranet and also on **RAIZ** website. At the same time, **Quinta de S. Francisco** herbarium increased to 223 specimens, establishing itself as a key historical-scientific testimony of the local flora.

TEAMBUILDING AND RELATIONS WITH THE LOCAL COMMUNITY

In order to promote teambuilding and an affective connection with the workplace, various activities were organized, in which our team contributed to the botanical enrichment of this place and in the control of weeds and invasive species, particularly acacia trees (Acacia spp.).

Quinta de S. Francisco also welcomed several internal training events involving **RAIZ'S** areas of activity, such as the "*Industrial Challenge*", where almost 200 colleagues from the Vila Velha de Rodão industrial site participated. We also had the pleasure of welcoming the children of our colleagues through the "*Colónia de Férias*" initiative, which allowed children to learn more about **RAIZ** and the forests.

Following the development of partnerships with local schools, **RAIZ** joined *Agrupamento de escolas de Eixo, Agrupamento de escolas de Oliveirinha, Agrupamento de Escolas Rio Novo do Príncipe (Cacia)* and ***Centro Social da Azurva***, establishing a small native Mediterranean Woodlot at **Quinta de S. Francisco**, also offering trees to some of these institutions in celebration of World Forest Day.

At the same time, **Quinta de S. Francisco** maintained its doors open to the community, welcoming, as in previous years, several Scouts camps. This year we received almost 200 elements from five Scouts groups, who sought this space, not only to camp during the weekend, but also to carry out activities or games in nature. In addition to the stunning natural landscape, **Quinta de S. Francisco** has safety conditions that allow these events to take place as planned.

In addition, our activities are included in the *Programa de Ação Educativa do Município de Aveiro* (PAEMA), which helps the dissemination of our activities to the school community of this municipality. The dissemination of our heritage and forests also received an additional boost with the application to the Sustainability program of the Fundação Calouste Gulbenkian which we believe will increase our disclosure, outreach and importance of forest and the bioeconomy.

09

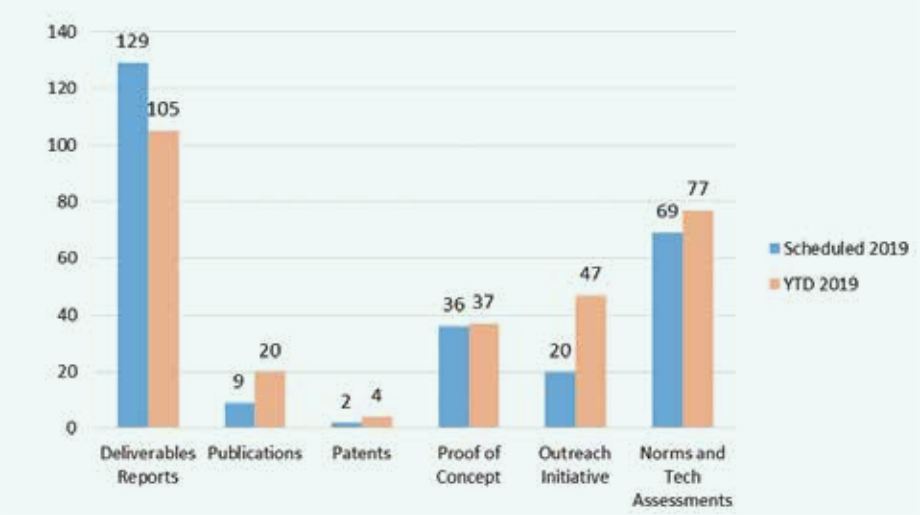
IMPACT EVALUATION

The impact assessment of **RAIZ's** R&D and innovation programs started to be carried out, in 2019, with the development of a new monitoring tool - *"Decision Support and Impact Assessment Methodology of Innovation and Knowledge Programs based on Research and Technological Developments in Organizations".*

This methodology allows decisions to be made based on the evaluation of indicators such as technological readiness versus the time it takes to enter the market, and the risk involved, thus allowing an objective understanding of the impact of each research program / project on the activity from **THE NAVIGATOR COMPANY**.

This new systemic approach to management and evaluation of the value created by innovation activities, and research and development, which allows to capture the interconnections between the different actors and the dynamics of the innovation life cycles, enhances a more complete assessment and communication of the real impact of these projects, making strategic decisions, that were usually supported only by financial return indicators, more robust.

RAIZ KEY PERFORMANCE INDICATORS



10 R&D INFRASTRUCTURE

NEW PHOTOVOLTAIC PARK

Following the decarbonization policy of **THE NAVIGATOR COMPANY**, **RAIZ** installed in 2019 photovoltaic panels on the buildings roofs. With this project, the consumption of external electricity will decrease and there will be periods with surplus energy that will be discharged into the public grid.

NEW REMOTE SENSING EQUIPMENT

In order to be better equipped and respond to advances in remote sensing image collection and treatment technology, **RAIZ** acquired a high resolution drone and cameras (Airborne Laser Scanning or ALS) as well as a Terrestrial Laser Scanning or TLS). This equipment is being used in several pilot studies that should allow the resolution of problems in the planning of operations and supervision of field work, as well as obtaining high resolution information to correlate with studies based on satellite images.

EVOLUTION OF THE TECHNOLOGICAL PARK INSTALLED AT RAIZ

Equipment for physical and structural tests of tissue papers was acquired and installed at the new conditioned environment laboratory at **RAIZ**, essential for paper quality control.

At the **RAIZ** Polo of Biorefineries and Bioproducts at Creative Science Park (CSP), in Aveiro, new analytical equipment was purchased and installed for biorefinery research, within the inpactus project, including, a Gas Chromatograph (GC-FID), a Mass Spectrometer with Chromatography (LC-MS), a High Pressure Liquid Chromatograph, and a Gel Permeation Chromatograph (GPC).

In the R&D and Services Laboratory of **RAIZ**, new equipment was also installed, such as Ion Chromatograph for analysis of sugars in wood, biomass cooking elicitors, analysis of anions in water, effluents and process currents, a Total Organic Carbon Analyzer (TOC) for water, eluate and effluent analysis and an Elementary Macro Analyzer for determining nitrogen, carbon and sulfur in waste, soil and plant material. A bench Electron Microscope (SEM / EDS) and a Parr Calorimeter were also purchased to assess the energetic power of liquors, biomass and fuel.

RAIZ increased the capacity of its biotechnology laboratory in genomic studies by 50%, with the acquisition of a new DNA Fragment Analyzer.

11 NATIONAL AND INTERNATIONAL COOPERATION

RAIZ PARTICIPATES IN THE ELIXIR NETWORK

RAIZ established a collaboration protocol with **ELIXIR**, a pan-European platform that coordinates, integrates and sustains bioinformatics resources between different countries and that allows users from academia and industry to access data and services vital to their research activities from an open innovation perspective.

INVITED NAVIGATOR CHAIRS

The main objective of the Invited Chairs of **THE NAVIGATOR COMPANY** in partnership with the inpactus co-driving Universities is to attract researchers and senior and renowned professionals in technological areas with international experience to Portugal, who can actively contribute to the development of knowledge in emerging areas and contribute for the qualitative development of R&D activities of interest to the University of Coimbra, the University of Aveiro and **THE NAVIGATOR COMPANY**.

In this context, in 2019, **Prof Thad Maloney**, Invited Chair NVG - University of Coimbra and **Prof Falk Liebner**, Invited Chair NVG - University of Aveiro started their activities.

PROFESSOR THAD MALONEY

PROFESSOR FALK LIEBNER

BIO-BASED INDUSTRIES CONSORTIUM (BIC)

RAIZ is an associate member of the Bio-based Industries Consortium (BIC). BIC is a non-profit organization created in Brussels in 2013 and represents the private sector in a Public-Private Partnership (PPP) with the European Commission, also known as the Joint Undertaking for Biological Industries (BBI JU). This public-private partnership plans to invest 3.7 billion euros in bio-based innovation between 2014 and 2020.

Bio-based Industries Consortium

FINNCERES

Aalto University Foundation and the VTT, Tecnhical Research Center of Finland, have created a cluster of competencies "**FinnCERES** - Competence Center for Materials Bioeconomics: a flagship for a sustainable future", within the framework of the Academy of Finland Program. **FinnCERES** is focused on future solutions in bioeconomics and materials research. The **FinnCERES** program aims to promote an interactive cooperation network with relevant companies in the forestry industry sector. **THE NAVIGATOR COMPANY** is part of this network, being represented by **RAIZ**.

RAIZ is involved in 23 national and international projects financed in partnership with Universities, Research and Development Centers and Companies, two of which started in 2019.

PROJECTS INITIATED IN 2019

Acronim	Title	Leader	Copromotors
R3Forest	Using exotic biomass for post-fire recovery: Reuse, Regenerate and Reforest	FCUL	RAIZ, IPBRAGANÇA IPCOIMBRA, UCOIMBRA
FireModSatII	Supporting FIRE-management decisions combining fire spread MODelling and SATellite data in an operational context in Portugal (part II)	ISA	NFP
ForestWise	Collaborative Laboratory on Forest and Fire Integrated Management	-	NAVIGATOR FOREST PORTUGAL
AlmaScience	Cellulose for Sustainable and Intelligent Applications	-	THE NAVIGATOR COMPANY + RAIZ
EcoLAB	Collaborative Laboratory towards a Circular Economy	-	RAIZ
BIOREF (ProBiorefinery)	R&D and Innovation on Bio refineries	-	RAIZ
PDPI e-globulus + EcoTissue	Patents registration: : e-globulus, *pasta casca* and eco-tissue	RAIZ	-
IDFoods	Food System of The Future – R&D on Sustainable Agrifood Systems and Healthy Nutrition	SONAE	RAIZ, INIAV, SILVEX, INL, UMINHO, UPORTO; PRGRUPO, FRULACT, MENDES GONÇALVES, INEGI
PDPI Flocos + Celsmartsense	Patents registration: Flocos + Celsmartsense internacionais	RAIZ	-

APPLICATIONS PREPARED/SUBMITTED/APPROVED DURING 2019

Consortium R&D Funding Proposals	Submitted	Approved	Rejected	Still in Evaluation
Total	16	2	3	11

ONGOING FUNDED PROJECTS DURING 2019

International Consortia R&D Projects	National Consortia R&D Projects	Base Funding	COLAB's	On going
4	15	1	3	23

12 EXTERNAL RECOGNITION AND CERTIFICATION

RAIZ, INTERFACE CENTER

In 2018, **RAIZ** was recognized as an Interface Center, having been awarded a multi-annual financing program (Basic financing granted by ANI - Agência Nacional de Inovação).

The balance at the end of the first year of execution of the basic financing is positive with the activities that contribute to the achievement of the 12 strategic objectives in progress and with a financial execution of 93% of the amount predicted for the first year of application.

IT IS WORTH MENTIONING THE FOLLOWING OUTCOMES:

- online access to international reference bibliographic sources with the signing of a protocol between the Foundation for Science and Technology I.P and **RAIZ**, for access to **B-ON**;
- the redefinition of **RAIZ'S** internal network and cooperation, aligning R&D activities with business and interested parties priorities;
- the definition of the external R&D and cooperation network, to be at the frontline of knowledge and partnerships with the new collaborative Laboratories, **CoLabs**;
- strengthening skills through the hiring of 11 Human Resources since November 2018;
- acquisition of equipment to support transversal laboratory activities and R&D activities in the area of biorefinery / bioeconomics and tissue.

BIC RAIZ

The **RAIZ** **Business Innovation Center** (BIC), accredited in December, saw a renewed accreditation in March 2019.

During 2019, several initiatives were underway to boost **BIC** **RAIZ**, namely an application to the Gulbenkian Sustainability program for the installation of a Social Bioeconomy Innovation Laboratory open to Civil Society, the "*Floresta do Saber*", as well as a program to boost entrepreneurship and to create value, aligned with the strategic axes of the inpactus project and expected to be applied for Compete funding during 2020.

Still in 2019, **RAIZ** was visited by the General Director of EBN - European Business Network, Javier Echarri, and Sara Monteiro participated in the annual BIC event in ROME, with an active role among the future co-investment instruments of the European Industry-EC Commission.

COLLABORATIVE LABORATORIES

The Collaborative Laboratories initiative (CoLab), promoted by the Foundation for Science and Technology (FCT) and the National Innovation Agency (ANI), aims to implement research, development, innovation and technology transfer centers in Portugal, involving R&D centers and agents / entities from the economic and social fabric, focused on strategic themes for Portugal. Collaborative Laboratories are constituted as private non-profit associations or companies.

RAIZ INTEGRATED 3 APPLICATIONS FROM COLLABORATIVE LABORATORIES, RECOGNIZED IN 2019:

BioRef - Collaborative Laboratory for Biorefineries, led by the National Energy and Geology Laboratory (LNEG).

AlmaScience - Pulp Research and Development for Smart and Sustainable Applications, led by the National Press Casa da Moeda (INCM).

eCOLab - Collaborative Laboratory for the Circular Economy, led by BLC3 - Campus for Technology and Innovation.

In 2019, the 3 associations that manage these Collaborative Laboratories were created, and the hiring of human resources began. **RAIZ** integrates the Boards of Directors of these 3 CoLabs: **BioRef** (Collaborative Laboratory for Biorefineries), **AlmaScience** (beyond paper), **eCOLab** (circular economy).

RAIZ also follows, through the membership of **THE NAVIGATOR COMPANY**, the **ForestWISE** - Collaborative Laboratory for Integrated Management of Forest and Fire.

13 GOVERNANCE

GENERAL SHAREHOLDERS ASSEMBLY

CHAIRMAN
António Pedro Gomes Paula Neto Alves

SECRETARY
António Alexandre de Almeida e Noronha da Cunha Reis

BOARD OF DIRECTORS

CHAIRMAN
Adriano Augusto da Silva Silveira

MEMBERS
Carlos de Pascoal Neto
Alexandre José Barreto do Vale
Carlos Miguel Faria Silva
João Paulo Cabete Gonçalves Lé
Joaquim António de Almeida Santos Belfo
José Manuel Namorado Nordeste
Nuno Miguel Pegado da Silva Neto
Pedro Miguel Costa Matos Silva

AUDIT COUNCIL

KPMG & Associados, SROC
represented by:
Paulo Alexandre Martins Quintas Paixão
(ROC)

SCIENTIFIC COMMITTEE

MEMBERS
Júlio Pedrosa

MEMBROS
Margarida Tomé
Carlos Fiolhais
Clemente Pedro Nunes
Filipe Duarte Santos
João Coutinho Mendes
Francisco Gírio

EXECUTIVE BOARD

GENERAL DIRECTOR
Carlos Pascoal Neto

ADMINISTRATIVE AND TECHNICAL SUPPORT DIRECTOR
Leonor Guedes

TECHNOLOGICAL RESEARCH AND CONSULTING DIRECTOR
Ricardo Jorge

FORESTRY RESEARCH AND CONSULTING DIRECTOR
Nuno Borralho

EXECUTIVE TEAM

GENERAL DIRECTOR
Carlos Pascoal Neto

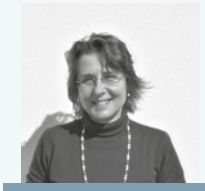
DEMONSTRATION, SCALE-UP, NEW BUSINESSES
Alexandre Gaspar

TECHNOLOGICAL SCOUTING
Mariana Oliveira

TECHNOLOGICAL RESEARCH AND CONSULTING
Ricardo Jorge

FORESTRY RESEARCH AND CONSULTING
Nuno Borralho

ADMINISTRATIVE AND TECHNICAL SUPPORT
Leonor Guedes



OUTREACH AND STRATEGIC PROJECTS
Cristina Marques

GENETIC R&D AND FORESTRY CONSULTING
Daniela Ferreira

SILVICULTURE RESEARCH
Sérgio Fabres

TECHNOLOGICAL RESEARCH
Paula Pinto

TECHNOLOGICAL CONSULTING
Luís Machado

ADMINISTRATIVE SUPPORT
Leonor Guedes

FIELD TECHNICAL SUPPORT
Cláudio Teixeira

SERVICES AND R&D LABORATORIES
Manuela Marques

14 PERSONNEL

Since November 2018, **RAIZ** has hired 11 new Human Resources (6 PhDs, 3 Masters and 2 Graduates) reinforcing its skills on the technological and laboratory areas and administrative support (2 Senior Technicians for Research and Technological Consultancy, 2 Technicians for the Laboratory and 2 Medium Staff). The remaining hirings resulted from the conversion of postdoctoral fellowships into employment contracts.

Several team building activities were carried out with the aim of strengthening ties between employees and group work, with emphasis on the Christmas meeting and the **RAIZ** Friday Seminars. The **RAIZ** Christmas Dinner is a moment of true collaboration, as the activities associated with it are organized by employees who strive in a truly committed way!

In order to promote group spirit and an affective connection to the workplace, several activities were also organized in which our employees contributed to the botanical enrichment of this place and to the fight against invasive and weed species, particularly the plucking of acacias (Acacia spp.).

PERMANENT STAFF	62	42	RESERACH FELLOWS
PHD	21	57	MSC

15 SEMINARS AND CONFERENCES

In terms of participation in seminars and conferences, the most relevant included the **XXV IUFRO World Congress 2019** held in Curitiba, Brazil, from September 29 to October 5, with a guest presentation at the special session dedicated to ***biological control of forest insect pests and pathogens*** and where the work ***"Enhancing control of Gonipterus platensis in Portugal: first steps towards a classical biological control program with a larval parasitoid" was presented.***

The Scientific-Technical Journeys of the Iberian Working Group of Inventory and Teledetection Forestal took place on June 11, in Madrid, Spain, where three works were presented, of which we can highlight the article entitled: "Volume calculation and DEM based products in Eucalyptus globulus plantations in Portugal using ad hoc LiDAR flights ".

Participation in the 19th International Metrology Congress, from September 24 to 26, 2019, held in Paris, France, with the work "Influence of storage time of pulp and paper industry wastewaters in AOX determination" presented by Manuela Marques and Micaela Soares.

RAIZ FRIDAY SEMINARS

The **RAIZ** ***Friday Seminars*** is an initiative that aims to promote interaction and knowledge transfer between employees from different areas, within **RAIZ** and the Company. During the year 2019, a total of 18 seminars took place, on Fridays, at the end of the morning, with different topics, from the Technological area to the Forestry, involving **RAIZ** and **THE NAVIGATOR COMPANY** employees. We have, for example, the seminar "New climatic classification for eucalyptus in Portugal", by Raul Rigoto, from the **RAIZ** Forestry Consultancy area and the theme "Nanocellulose in paper production", by Ana Filipa Lourenço, from the Research and Technological Development area.

16

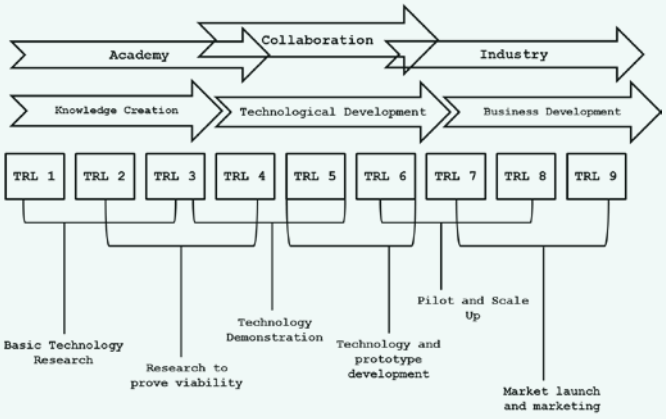
PATENTS - HIGHLIGHTS

Of the various patents submitted, considering the different activities of **RAIZ**, three inventions are chosen here to be described in more detail. These inventions were submitted to the International and European Offices, following priority requests in Portugal.

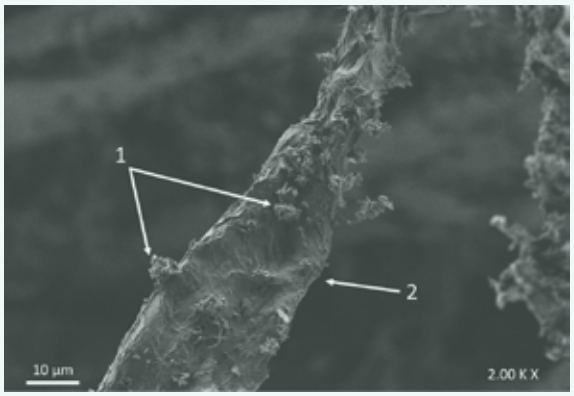
One invention considers a management and value assessment methodology co-created by innovation, research and development activities, capable of identifying economic and social value, intangible assets, anticipating and measuring efficiency and effectiveness, and allowing for the analysis of causalities.

Another invention, developed in collaboration with the University of Coimbra, aims to solve the current problem of using synthetic additives, harmful to the environment and costly, in the process of producing paper material with improved paper properties, through the use of flakes consisting of mineral fillers conjugated with cellulose microfibrils or nanofibrils, developed for application in cellulosic fibers.

Finally, the e-Globulus project resulted in a platform for indicating customized forestry practices for the management of eucalyptus plantations, in the different stages of development of the stands and for the different edaphoclimatic conditions existing in Portugal, developed within the scope of the project. The platform, which is supported by geographic information systems, will be easy to use by users, namely companies in the forest sector, forest owners' organizations and private forest producers.



WIPO | PCT
The International Patent System



Flocs (1) attached to a cellulosic fibre (2)

17 RELEVANT FACTS OCCURRED AFTER THE END OF THE YEAR

This Report cannot fail to mention, in this temporal context, the impact of the Covid-19 virus pandemic on our operations.

Internally, the Company is permanently monitoring the evolution of this public health emergency situation, having implemented, at the end of February, a contingency plan based on the guidelines of the Directorate-General for Health. The contingency plan essentially intents to safeguard the health of all employees and of our community, while keeping the business activity operating within normal limits.
The Company is also assessing the potential impacts of Covid-19 on its economic activity, based on a risk assessment, still ongoing.

While it's true that we are living a unique period of high uncertainty, we are working hard to minimize the potential impacts of this pandemic on our activity and we are convinced that, with prevention, serenity and together with all our partners, such as customers, suppliers and local communities, we will be prepared to face this challenge.

FUTURE PROSPECTS

Without prejudice to what was mentioned in the previous point, no significant changes in the Company's activity are expected for 2020.

BUSINESS CARRIED OUT BETWEEN THE COMPANY AND ITS DIRECTORS

No business was carried out between the Company and its Directors.

PROPOSED IMPLEMENTATION OF RESULTS

The Direction of RAIZ - Forest and Paper Research Institute, proposes to its partners that the net result of the 2019 financial year, in the amount of (17,946 €), be taken to the retained earnings account.

BOARD OF DIRECTORS

Adriano Augusto da Silva Silveira _____

Carlos de Pascoal Neto _____

Alexandre José Barreto do Vale _____

Carlos Miguel Faria Silva _____

João Paulo Cabete Gonçalves Lé _____

Joaquim António de Almeida Santos Belfo _____

José Manuel Namorado Nordeste _____

Nuno Miguel Pegado da Silva Neto _____

Pedro Miguel Costa Matos Silva _____

18 FINANCIAL STATEMENTS

BALANCE

Amount in €	Note	2019	2018
ASSET			
Non-current assets			
Tangible fixed assets	7	2 034 873	1 599 342
Intangible assets	-	10 633	2 193
Investment - equity method	8	2 000 640	-
Other financial investments	-	35 629	4 706
Deferred income tax assets	-	125 589	-
		4 207 364	**1 606 241**
CURRENT ASSETS			
Costumers	11	1 487 962	846 051
State and other public entities	12	160 708	2 089
Other receivables	11	10 375 422	11 104 608
Cash and bank deposits	5	266 919	233 016
		12 291 011	**12 185 764**
TOTAL ASSETS		**13 792 005**	**9 373 989**
SHAREHOLDER'S EQUITY AND LIABILITIES			
Shareholder's equity			
Funds	13	9 000 000	7 000 000
Results carried forward	13	247 343	168 232
Other equity changes	13	385 744	95 882
		9 633 086	**7 264 114**
Net profits		(17 946)	59 501
TOTAL SHAREHOLDER'S EQUITY		**9 615 140**	**7 323 615**
LIABILITIES			
Non-current liabilities			
Responsibilities for post-employment benefits	15	-	97 534
Liabilities by deferred taxes	10	-	3 321
		-	**100 855**
CURRENT LIABILITIES			
Suppliers	14	1 029 863	133 830
State and other public entities	12	142 816	254 469
Other payables	14	2 243 831	560 143
Deferrals	16	3 466 725	5 419 092
		6 883 234	**6 367 534**
TOTAL LIABILITIES		**6 883 234**	**6 468 389**
TOTAL SHAREHOLDER'S EQUITY AND LIABILITIES		**16 498 375**	**13 792 005**

INCOME STATEMENTS

AMOUNT IN €	Note	2019	2018
Sales and rendered services	17	4 474 129	4 680 035
Operational subsidies	18	1 857 250	585 294
Profit/(loss) incomes imputed from subsidiaries, associates and joint ventures	-	644	-
Supplies and external services	19	(2 363 928)	(1 918 668)
Staff costs	20	(3 762 633)	(3 350 680)
Other income	21	41 811	131 324
Other expensives	22	(40 593)	(23 630)
INCOME BEFORE DEPRECIATION, FINANCING EXPENSES AND TAXES		**206 680**	**103 675**
(Expenses) / reversals of depreciation and amortization	7	(130 384)	(151 758)
TRADING INCOME (BEFORE FINANCING EXPENSES AND TAXES)		**76 296**	**48 083**
Interest and similar income obtained	23	39 067	41 475
Similar interest and expenses incurred	23	(4 345)	(793)
RESULT BEFORE TAXES		**111 017**	**(7 401)**
Income tax	10	(128 964)	66 902
NET PROFIT		**(17 946)**	**59 501**

ECONOMIC AND NON-ECONOMIC ACTIVITIES

	Economic	Non Economic	Sums
Costs			**6 301 884**
Current Activities	3 695 167		
Financed Projects		2 476 333	
Depreciations	130 384		
Incomes			**6 412 901**
Services Rendered to Clients	4 474 129		
Interests and similar Incomes	39 711		
Other incomes	41 811		
Subsidies		1 857 250	
BALANCE	**730 100**	**-619 083**	**111 017**

PRINTED ON SOPORSET PREMIUM OFFSET 120 g/m² PAPER PRODUCED BY THE NAVIGATOR COMPANY FROM SUSTAINABLY MANAGED FORESTS.

RAIZ

PART OF
THE NAVIGATOR
COMPANY

RAIZ - Forest and Paper Research Institute
Quinta de S. Francisco,
Rua José Estevão (EN 230-1) , nº 221
3800-783 Eixo, Aveiro,
Portugal

(+351) 234 920 130
raiz@thenavigatorcompany.com
www.raiz-iifp.pt/en