

2022 ANNUAL REVIEW

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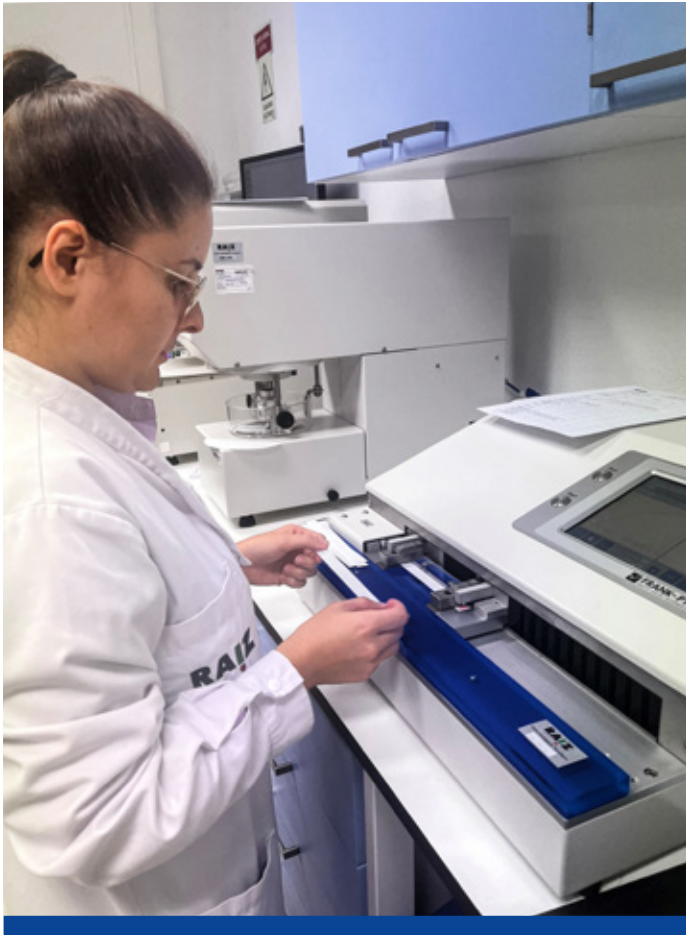
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2022 KEY PERFORMANCE

PRIVATE FINANCING

€6,1M

PUBLIC FUNDING

€2,5M

PROOFS OF CONCEPT

94

NEW BUSINESSES (PROPOSALS UNDER STUDY)

8

SCIENTIFIC PUBLICATIONS

82

PATENTS

20



João Lé
Chairman of the Board of RAIZ



Carlos Pascoal Neto
General Director of RAIZ



2022 GLOBAL OUTLOOK

2022 was a landmark year for RAIZ, as an entity that promotes a new bioeconomy, based on sustainably managed eucalyptus planted forests.

The highlight of the year goes, naturally, to the conclusion of the *inpactus project* — *Products and Technologies and Innovators based on Eucalyptus*, the biggest R&D investment in Portugal in science and technology to support forest-based bioeconomy. This project was developed in co-promotion by The Navigator Company, RAIZ, University of Aveiro and University of Coimbra, in partnership with 7 national and foreign universities and R&D centres. *Inpactus*, which reached or exceeded the performance indicators initially foreseen, made it possible to respond to short-term challenges of The Navigator Company, originating 4 innovative products for the market, creating knowledge to support 8 potential new products and businesses based on the planted eucalyptus forest, representing alternatives to products of fossil origin. It was stimulating to demonstrate that from the national eucalyptus (*E. globulus*), in addition to paper and cellulosic materials, one

could obtain the same products that today result from a petrochemical refinery: biofuels, biochemicals and biomaterials, including bioplastics and biocomposites, with the advantage of being sustainable.

But to develop a true and modern forest-based bioeconomy, we need to assure raw material, coming from certified, resilient, and productive planted forests, in harmony with conservation forests. The work carried out by RAIZ in the field of genetic improvement (natural selection), good practices in forestry and forest management, pests and diseases control and, in particular, the transfer of this knowledge to forestry producers and society in general, was and will be decisive for the consolidation of this new forest-based bioeconomy in Portugal.

Equally relevant was RAIZ's contribution to guaranteeing the performance of national pulp and paper industrial units, in particular in optimizing the use of natural resources, including wood and water. Of particular note is the 10% global reduction in the use of water in the industrial process at Navigator factories.

Overall, in addition to the economic, social and environmental impact, the results achieved gave rise to 20 patents and 82 scientific publications. These results were also decisive for the recognition of RAIZ by ANI — National Innovation Agency, as CTI — Center for Technology and Innovation. This activity was also crucial to leverage new projects in the context of the Recovery and Resilience Plan (PRR), particularly in production forest and in new applications of cellulosic fiber in packaging materials and textile fibers. The success of this institution is due to a highly committed and motivated team, but also to an associative structure and governing bodies aligned with the purpose of leaving a safer and more sustainable planet for future generations, where the forest and the forest-based bioeconomy will play an increasingly pivotal role.

To all, our thanks for the dedication, commitment and for the excellent results achieved.

A close-up photograph of a laboratory experiment. A metal spoon is held horizontally, pouring a thick, dark, viscous liquid into a clear glass beaker. The beaker is held by a hand wearing a purple nitrile glove. The background is a blurred laboratory environment with various equipment and tubes. The text 'RESEARCH, DEVELOPMENT AND INDUSTRIAL CONSULTING' is overlaid in large, white, bold, sans-serif capital letters, centered on the page. The text is flanked by two horizontal white lines.

RESEARCH, DEVELOPMENT AND INDUSTRIAL CONSULTING

In 2022, RAIZ's Industrial Research and Consultancy team remained focused on supporting the industrial activity of companies in the pulp and paper sector, through support for initiatives to optimize processes and the quality of their products, pulp, paper and tissue.

1



WOOD

In 2022, RAIZ continued to monitor the specific consumption of wood by The Navigator Company, with a methodology developed internally, based on a forecast model that uses different procedural and laboratory data-inputs, which are very important for factories to optimize consumption of this raw material in its Industrial Complexes.



2

WATER USE

Aware of the growing importance of minimizing the use of water in indus-

trial pulp and paper production processes, RAIZ continued to ensure the coordination of initiatives in place at The Navigator Company aimed at this objective.

The continuous identification of the best technologies and practices, their implementation and the on-site monitoring of initiatives already implemented, are the basis for the reduction in water use already achieved. In 2022 in particular, new pulp washing strategies were implemented and ultrafiltration tests continued with clarified water from the paper production process, with a view to its internal re-use. These measures led to an overall 10% reduction of water in the factories. Other opportunities for minimizing water use have already been identified. These opportunities will be pursued and could be implemented as early as 2023, depending on their technological maturity.

3



RECYCLABILITY OF EUCALYPTUS FIBER

A study carried out by RAIZ and the University of Beira interior demonstrated the recyclability of unbleached *Eucalyptus globulus* pulp, produced by The Navigator Company in the Industrial Complex of Aveiro, as well as its excellent aptitude for the production of packaging paper. The results were published in the internationally recognized technical and scientific journal, the *Tappi Journal* (February 2023). These results prove that *Eucalyptus globulus* fibers are more recyclable,

with the ability to withstand at least five times more recycling cycles than fibers from other species, without losing characteristics that make them suitable for the production of paper with higher mechanical strength.

4



NEW PACKAGING PAPERS

In 2022, RAIZ continued to monitor the development of packaging paper, at an industrial level, participating in continuous improvement initiatives, both in terms of the process, optimizing resources, and in terms of the quality of the final product, carrying out laboratory tests and monitoring industrial tests.

Among others, improving the physical-mechanical attributes of this range of papers was a topic that deserved particular attention from RAIZ, with innovative materials having been explored at an industrial level with promising results.

With this in mind, studies were also continued on the incorporation of microfibrillated cellulose at the laboratory level, for the production of paper with greater mechanical resistance. It is also worth highlighting the monitoring of the production of unbleached eucalypt pulp carried out by RAIZ, which was at the genesis of the production of unbleached papers produced and sold by The Navigator Company.

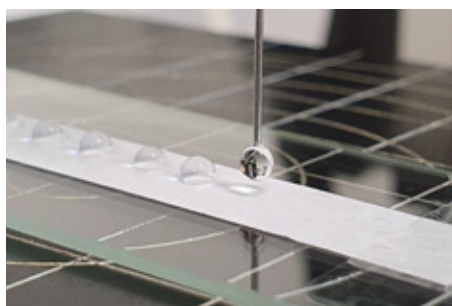
5



PAPER WITH BARRIER PROPERTIES

The growing diversification of The Navigator Company's product portfolio in the packaging paper segment, with a special focus on its ability to come into contact with food, led RAIZ to support the Company in a series of initiatives aimed at developing new products, in which the need for barrier properties against oils and fats, water vapour, oxygen, among others, is fundamental.

Thus, RAIZ continued to identify and test the most promising sustainable solutions in the laboratory. Some of the solutions already identified have the potential to be applied on an industrial scale.



6



MOLDED PULP

Cellulose-based packaging products, such as molded cellulose, produced by the thermoforming process, have been the target of increasing interest from consumers and brand owners, due to their more sustainable nature, when compared to plastic on the market. Aware of this trend, RAIZ supported The Navigator Company in a series of initiatives, including a preliminary market analysis, with a view to access the suitability of eucalypt pulp for the production of this product.

It was thus possible during 2022, through an extensive test plan, to prove that the pulp produced from eucalypt is suitable for the production of this product.

Several tests were also carried out with a view to identifying sustainable solutions for obtaining barrier properties in molded cellulose articles.

7



ENVIRONMENT AND ENVIRONMENTAL COMPLIANCE

The optimization of the WWTPs at The Navigator Company's Industrial Complexes was started, with improvements in their operational stability, operating costs and diagnostic capacity already being recognized, thanks to the implementation of new process monitoring methodologies, in close coordination with the operational teams.

RAIZ continued to ensure the coordination, which began in 2021, of CEPI's Issue Group for the Directive on Industrial Emissions in the Pulp and Paper Sector, in the European Community, and to monitor the development of new environmental standards.

8



NEW TISSUE PRODUCTS

2022 saw the launch of yet another innovative tissue product by The Navigator Company, the AMOOS CALORIE CONTROL™ in which RAIZ participated. An innovative kitchen towel with greater capacity to absorb oil from food, allowing us to enjoy healthier meals, with less oil and fewer calories. The development of other new innovative tissue products was also a reality, with some of these developments having already been tested on an industrial scale. Rigorous performance and quality tests are currently underway on the industrially obtained prototypes.

1

SHELLUTIONPLUS

The ShellutionPlus project — the use of nanoporous eggshell in ink and paper fillers, started in 2022, as a proof-of-concept (PdC) project, following the Shellution Project, in which RAIZ participated. A new mineral filler developed from biogenic calcium carbonate (BCC), present in eggshells, with a high surface area, has allowed paper sheets to be obtained in the laboratory with physical-mechanical properties superior to those obtained with natural calcium carbonate (GCC) and of the same order of magnitude as those obtained with precipitated calcium carbonate (PCC), demonstrating the potential of this new type of mineral filler for the production of printing and writing papers.



2

B2-SOLUTIONS

The B2-Solutions project aims to obtain new packaging papers with water vapor barrier properties, through the application of more sustainable materials, using the extrusion process. RAIZ supported the project partners in the development and testing of disruptive solutions for polymeric composites for extrusion on paper, having so far obtained films with promising

FINANCED R&D PROJECTS

barrier properties to water vapor. The project is still under development, and the current focus is on developing new formulations with even more effective water vapor barrier properties, applying the most promising formulation by extrusion on the surface of the paper on a laboratory scale and on an industrial scale.



EUROPEANS

3

BL2F

In this project, technology is being developed to, from black liquor and in an integrated manner with pulp production units, produce a biocrude that is subsequently converted into fuel for aviation and maritime transport. In 2022, the design and construction of a pilot-scale reactor to test the conversion of black liquor into biocrude was completed, initiating trials with samples of black liquor from The Navigator Company. In parallel, specific catalysts were developed for the conversion of biocrude into final products, so that this conversion can be implemented in conventional refineries of petroleum products.



4

MOVE2LOWC

The Move2LowC project aims to produce biofuels for aviation (bio-jet fuel) and for road transport (biohydrogen and biomethane). In 2022, with the participation of RAIZ, sugar syrups were produced by enzymatic hydrolysis from eucalypt bark subjected to a steam explosion process. For the conversion of sugar syrups into lipids, using biological catalysts through a fermentation process, the most promising strains of microorganisms were selected. The increase in scale of the fermentation process was initiated and the lipid extraction process and its conversion into bio-jet fuel were optimized.





IMPACTUS PROJECT

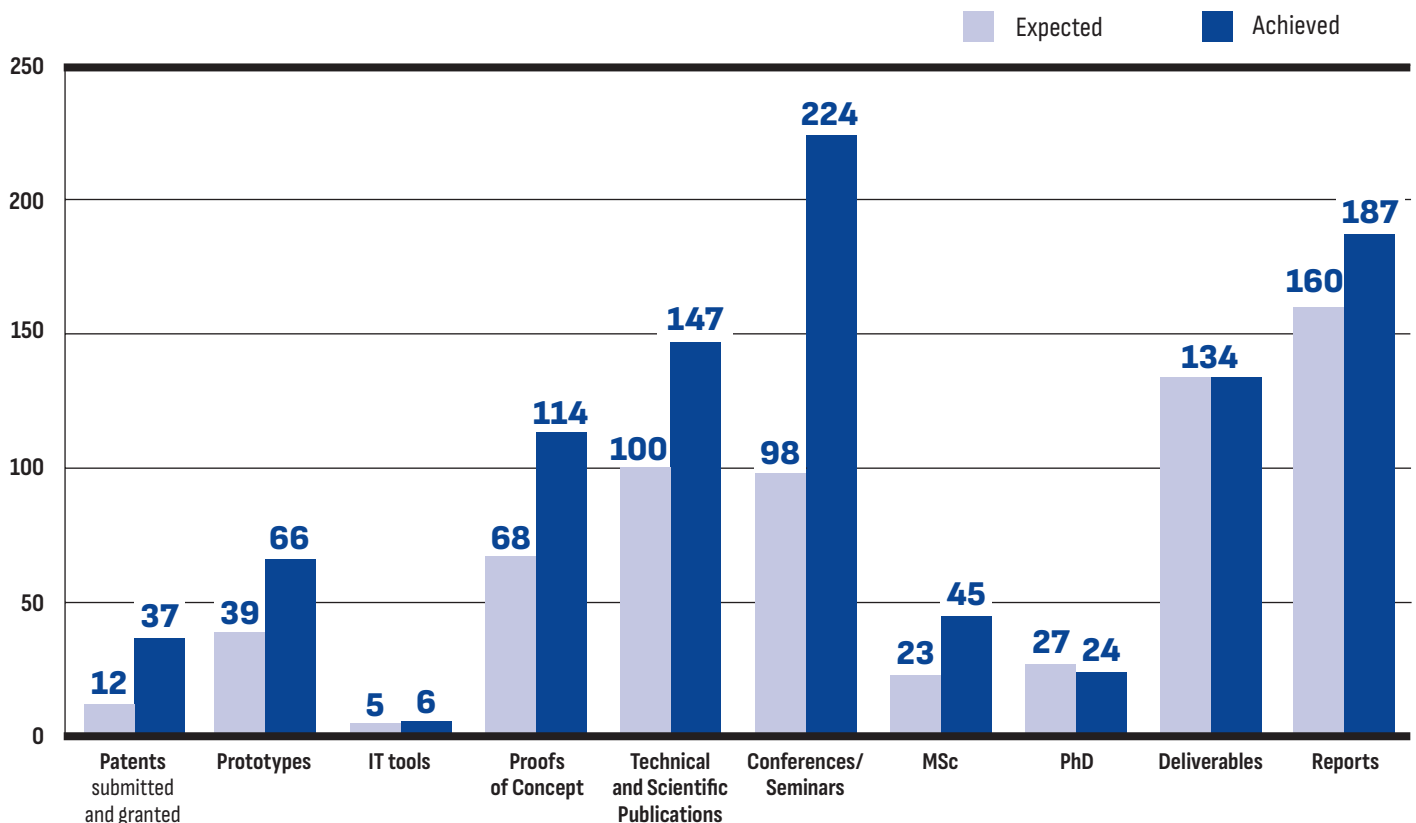
COMPLETION OF THE IMPACTUS PROJECT AND FUTURE PERSPECTIVES

A step towards a greener, global, sustainable and competitive Bioeconomy in Portugal, based on Eucalyptus and the Pulp and Paper Industry.

This project, completed in 2022, represents the largest investment in Portugal in an R&D project in forest-based bioeconomy, developed in co-promotion between The Navigator Company, RAIZ, the University of Coimbra and the University of Aveiro, in partnership with multiple entities. With a global investment of EUR 14,6 million and a planned incentive of 9 million with a 100% execution, the project gathered more than 180 researchers and technicians.

The final event, held on October 19, 2022 at Biocant Park in Cantanhede, was a moment of celebration of the success of this project, which is already a national and international landmark of university/industry co-operation. The event was attended by the Minister of Science and Technology, Professor Doctor Elvira Fortunato. During the event, the most relevant products and prototypes of the project were on display.

In the following lines, we present the main results of the project, achievement indicators and the reality that is now anticipated for the coming years.





António Redondo — CEO The Navigator Company



Sara Monteiro — Science and Technology Manager at Inpactus; Paula Pinto – Research and Technological Development Coordinator at RAIZ



Carlos Pascoal Neto — General Director of RAIZ; João Lé — Chairman of the Board of RAIZ, Elvira Fortunato — Minister of Science and Technology; Amílcar Falcão — Rector of the Coimbra University; Ana Pinto Machado — Director of Incentives AICEP



Several products and technologies were developed with a direct economic impact on The Navigator Company's Core Business, in particular high-yield eucalypt kraft pulp (20% reduction in wood consumption), which is at the origin of a new family of packaging papers, the gKRAFT. The Navigator Company launched this products in 2021 and, in the area of tissue paper, innovative and differentiating products: with unbleached eucalypt kraft pulp, Amoos NATURALLY SOFT™, tissue paper with a floral fragrance aroma, Amoos AIR SENSE™ and even tissue paper, Amoos AQUACTIVE™, whose cleaning function is activated in the presence of water.



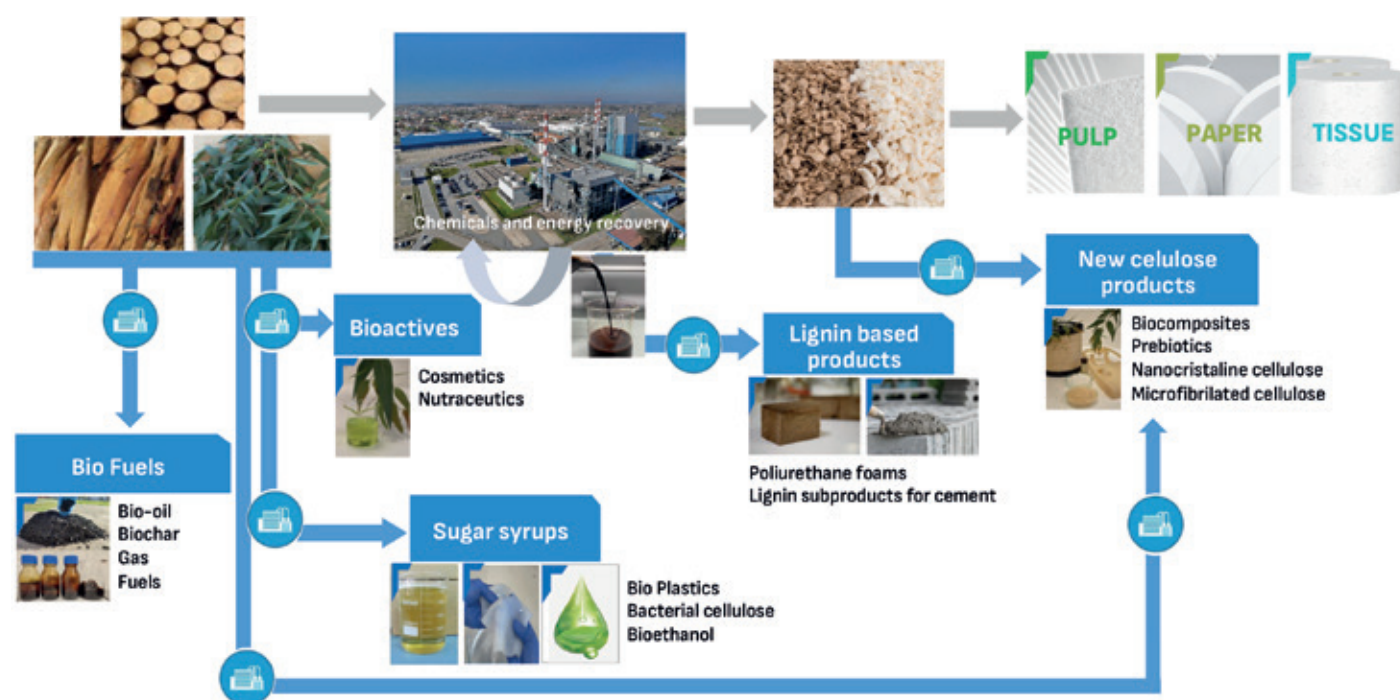
Within the scope of inactus, tools for computer simulation of processes were also developed to support decision making and optimization of the industrial pulp production process, including the optimization of the use of wood and water resources. Lifecycle and sustainability analysis was carried out for tissue and printing and writing paper, according to various scenarios, supporting new measures and communication initiatives.

Technologies by enzymatic action were also explored in the project, to optimize the pulp production process and differentiate paper products, such as in the bleaching stage in the pulp production process and in the preparation of pulp for tissue paper production.

Also noteworthy are solutions for new paper functionalities and the study of microfibrillated cellulose production processes from the Company's pulps, bleached and unbleached, and its application in paper, as an agent promoting mechanical resistance and a component of formulations for surface treatment.

In the context of a circular bioeconomy and biorefinery integrated into a pulp and paper mill, the potential of eucalypt biomass to generate materials and products has been demonstrated, assuming itself as renewable-based alternatives.

New opportunities: bioproducts and biorefinery integrated in the Pulp & Paper industry





Cellulosic derivatives were obtained from eucalypt pulp, for application in the paper, food and cosmetics industries, prebiotics for application in nutraceuticals, as well as biocomposites incorporating cellulose in bioplastics, with potential use in injection and molding of plastics, filaments for 3D printing and industry textile. Processes were studied and developed to produce, from forest biomass, bioactive compounds and essential oils with biological activities at various levels (anti-inflammatory, depigmenting and anti-aging of the skin, anti-dyslipidemic effect, neuroprotective action) thus having potential application in pharmacy, cosmetics and hygiene products, nutraceuticals and animal feed ingredients. It was also possible to demonstrate that industrial black liquor lignin is applicable to the production of polyurethane foams, adhesives and composites with characteristics similar to current commercial options.

Deconstruction processes were evaluated for the preparation of biomass for the production of sugars, with value in itself. In turn, the sugars were used to study the optimization of bioethanol and bacterial cellulose production. For the conversion of biomass to biofuels and biochar, laboratory pilot units were developed with the flexibility to adjust the conditions according to the intended product to optimize the pyrolysis and biomass gasification processes. New ecological mortars and cements were developed with the incorporation of ashes from biomass boilers (by-products of the process), in the industrial demonstration phase. In projects with a higher TRL (technological maturity level), a technical-economic evaluation, modelling, simulation and scale up of the processes was carried out. This included the production of biocomposites (with a pre-production and extruder unit) and in the extraction of bioactive compounds (with an EO and solids-liquid extraction unit), allowing pilot-

scale evaluation of the integrated and sequential extraction process. Some of the developments are being endogenized by the Company, others will move on to the industrial testing phase, others will continue within the scope of the PRR agendas or even in the Co-creation Program meanwhile started in 2022.

inpactus deserved recognition for the university-industry collaborative model of the OECD in 2017, allowing the appreciation of the RAIZ institute as a Business Innovation Center and the creation of Floresta do Saber, financed by the Calouste Gulbenkian Foundation, for the dissemination of science carried out in the field of inpactus to future generations, which also allowed RAIZ to be recognized as a UNESCO Club.

Some of the management methodologies such as the patented impact assessment methodology and the technological surveillance activity will be conceptualized in the form of IT tools through the INOV C+ project (ongoing, financed by the CCDRC).





RESEARCH, DEVELOPMENT AND FORESTRY CONSULTING

In 2022, RAIZ Forest Research and Consultancy team pursued several lines of work generating and disseminating knowledge supporting a more productive, resilient and sustainable eucalypt forest. The projects ranged from forestry, genetic improvement, protection to environment. Transversely, the development of remote detection and information processing technologies continued to support research.

RAIZ has also been heavily involved in numerous initiatives for dissemination, training and technical support for forestry producers and their associations, service providers and agents in the sector and society in general.

1



GENETIC IMPROVEMENT

The genetic assessment of the breeding population was updated in 2022 with significantly enhanced information on disease resistance and rooting success. The rescue of new elite clones (about 100) was initiated, which will renew, with significant gains, the current production clones.

In the area of plant propagation, RAIZ research nursery completed several studies in search of biological alternatives to the use of IBA (rooting hormone) and pesticides. In this context, *Trichoderma* was tested as a biological fungicide and rooting inducer with interesting, alas inconsistent results.

2



UNDERSTANDING THE EUCALYPT NATURALIZATION PROCESSES IN PORTUGAL

The WildGum II project was successfully completed, further understanding the naturalization processes of *Eucalyptus globulus* in Portugal, through the use of remote sensing and genetic markers. The project was a partnership between RAIZ and Instituto Politécnico de Coimbra / Escola Superior Agrária de Coimbra. In one of the published papers from this project, it was reported that pollen dispersion and sowing are localized, and that there was a significant increase in inbreeding in plants from natural regeneration. The study is now being extended to other naturalized stands.

3

CLIMATE ADAPTATION

A detailed study of the impact of climate change on eucalypt stand productivity was completed, based on climate and forest inventory data from 2002 to 2020. There was a significant reduction in precipitation and increase

in temperature, and a concomitant reduction in productivity in the last two decades, although with inter-annual oscillations. In some periods, these losses represented a drop of up to 20% in the average forest potential.

4



NEW ECOVESSELS BASED ON INDUSTRY WASTE

New materials based on by-products from the pulp and paper industry, developed within the scope of the impactus project, were tested for use as plant containers. These echovesels revealed good integrity and physical resistance. Soil analysis and plant growth tests with several ornamental species showed normal development and survival.

5



FACILITATE THE SUCCESS OF THE PLANTATION, WITH THE USE OF WATER RETAINERS

In order to mitigate the impact of rainfall variability during autumn and spring, RAIZ sought to find solutions that ensure plantation with high survival and homogeneity, through the use of hydro retentors (polymers capable of retaining water). During the year 2022, RAIZ in collaboration with the Escola Superior Agrária de Coimbra (ESAC), demonstrated a positive effect of using this type of polymers applied in dry or hydrated conditions, particularly in sandy soils. One month after planting, there was no mortality and it was possible to verify the existence of the hydrated polymer involving the tube and roots.



6



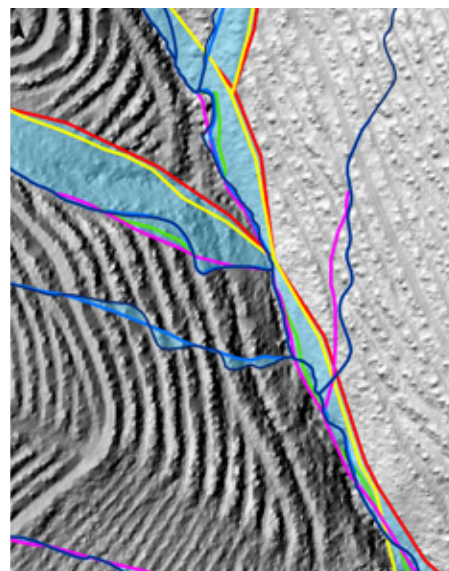
CONTROLLED FIRE AS A SOLUTION TO LIMIT FOREST RESIDUES

The main results from the FirEProd project — controlled fire as a fuel management strategy (cutting left-overs) in eucalypt plantations, a collaboration with the University of Aveiro and The Navigator Forest Portugal, were announced at an event attended by various official entities, allowing an open discussion about this technique.



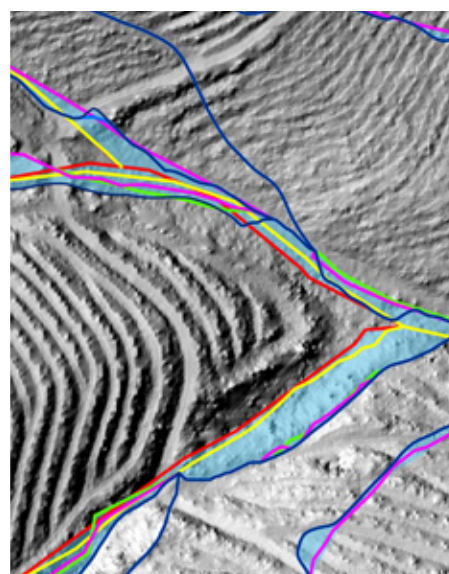
Technical session and field day on the use of controlled burning in Quintarreí, Valongo

7



EUCALYPT BASIN HYDROLOGY

RAIZ continued to develop knowledge about the behaviour of hydrological basins, with the publication of two papers in international journals. One paper reported the effectiveness of terraces as a soil and water conservation measure in the basin. The other analysed the impacts of climate change on the watersheds, hydrological responses and biomass production in a basin under the influence of Mediterranean climate.





BIOLOGICAL CONTROL OF EUCALYPT PESTS

The eucalypt weevil and the tanning bug are among the most important eucalypt pests in Portugal. Both cause defoliation of the canopy with consequent reduction of wood production. One of the most effective strategies for controlling these pests is the use of biological control techniques, which consists of introducing specific natural enemies. In the case of the eucalypt weevil (*Gonipterus platensis*), the fly *Anagonia lasiophthalma* parasitizes the weevil larvae, being one of the most promising natural enemies. This fly has been studied by RAIZ in recent years, and in 2022 the laboratory tests required by the competent national authorities for its release in the field were completed. These studies indicate that *Anagonia* does not attack insects other than the weevil and that it may have a relevant effect in reducing their populations. In 2023 we expected to initiate releases of this natural enemy in affected eucalypt plantations. As for the tanning bug (*Thaumastochoris peregrinus*), the release of its main natural enemy, *Cleruchoides noackae* in Portugal, has been authorized at the end of 2021 by the Institute for the Conservation of Nature and Forests. In 2022, RAIZ intensified the laboratory production of this organism, with around 9.000 insects having been released by the end of the year in eighteen affected locations.



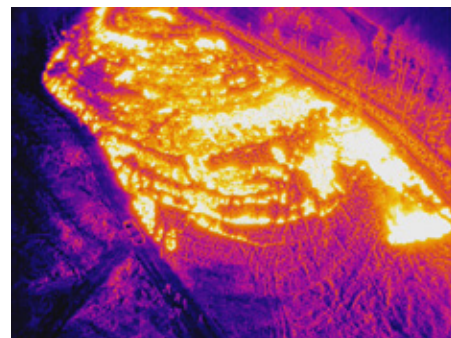
Anagonia, new natural enemy of the eucalypt weevil.



Settlements attacked by *Phoracantha* spp.

MONITORING THE PHYTOSANITARY CONDITION OF THE EUCALYPT FOREST

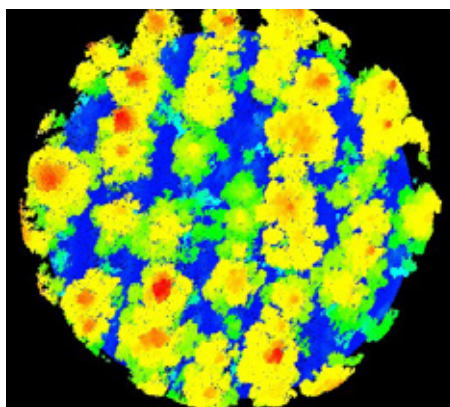
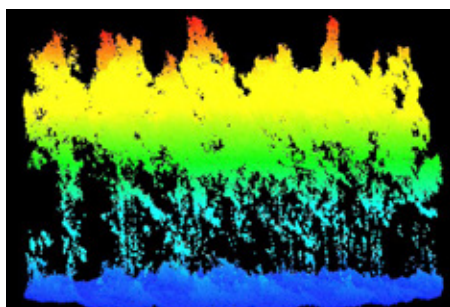
RAIZ regularly assesses the phytosanitary condition of the Portuguese eucalypt forest, providing maps of the occurrence of the main pests and diseases. This information is the basis for implementing control plans and makes it possible to assess their temporal and spatial evolution or to detect new pests that may threaten the sustainability of forest production at an early stage. In 2022, a survey was carried out on the area affected by *Gonipterus platensis*, on the mortality caused by *Phoracantha* spp. at a national level and of the occurrence of the new pest *Trachymela sloanei*.



Caption: Detection of hot spots using a thermal camera attached to a drone.

FOREST MANAGEMENT SUPPORT TECHNOLOGIES

Examples of the application of innovative knowledge during 2022 include the analysis of the risk of forest fires in eucalypt plantations. The project of digital soil maps was initiated using remote detection by satellite, as an auxiliary tool for edaphoclimatic zoning teams. Eight proofs of concept and three scientific publications were produced, including predictive models for calculating the volume of standing wood, using aerial LiDAR technology and a methodology for real-time detection of hot spots in controlled fire scenarios with a thermal camera attached to drones. Regarding support for initiatives promoted by the industry, we highlight drone mapping for the burnt areas program.



Caption: Different views in a plot surveyed with LiDAR-UAV.



Caption: Aerial survey with drone in post-plantation area.



FOREST EXTENSION

Within the scope of the various forest promotion and extension programs, together with forestry owners and agents, 96 technical recommendations for eucalypt management were generated for private owners, within the scope of the Premium Program, covering 1.671 ha, with 69% of these areas referring to maintenance recommendations and 31% to reforestation. More than 200 industry professionals, forest operators and technicians participated in 46 technical training sessions.

The year was rich in public event participation and the production of content for technical dissemination related to eucalypt silviculture and the safety of forest operations — promoting management in different arenas. As an example, three technical documents were developed (control of spontaneous vegetation, improved plant and selection of poles) for the magazine *Produtores Florestais* and the second Technical Manual was published, dedicated to the operation of pole selection.





SERVICES

FOREST TECHNICAL SUPPORT

In 2022, the Technical Forest Services team developed several studies and supported activities for The Navigator Company forest chain and different RAIZ forestry R&D projects. In particular:

→ 347 forest potential studies, edaphoclimatic zoning and productivity estimation, which made it possible to characterize in loco 15.200 hectares of land, spread across Portugal and Spain. These studies generated new information allowing support to decision-making in forest investments, leasing and land purchase, definition of forest management models for each site and the preparation of forest reforestation projects.

→ The installation and monitoring of new forest inventory plots in Galicia allowed: i) to increase the network of plots, both in number and in the geographic scope of the sampled stands, ii) to characterize and frame each plot in edaphoclimatic terms, iii) to obtain more dendrometric data stratified by soil condition and climate, iv) to generate new knowledge about the productive potential of eucalypts in Galicia. This work resulted in a new matrix of productivity estimates for *E. nitens* stands.



→ Carrying out two forest macro suitability studies in Spain, encompassing a total of 270.000 hectares.

These studies made it possible to increase knowledge about forest suitability, productive potential, the risks of biotic and abiotic events in these areas, and to define silvicultural models. As a result, it is worth highlighting the development of new maps of forest aptitude and production potential, considering the average edaphoclimatic characteristics of the regions under study.



→ In Portugal, a forest macro suitability study was also carried out in an area of 12.000 hectares. This work made it possible to estimate, in a macro way, the different forest potential existing in this area and also provide technical indications in order to reduce the risk associated with decision-making on forest investment and to support management decisions at the landscape level.

→ The technical support provided to RAIZ's different forestry R&D projects, most notably the dendrometric monitoring activities of more than 17.000 trees and the installation of 20 tests on the field, to test silvicultural practices and genetic materials. Among other activities, soil and plant material were collected for the nutritional assessment of stands, and support was given to monitoring pests and diseases in eucalypt stands.

LABORATORY

During 2022, support was given to the control of solid waste landfills at The Navigator Company factories and the characterization of imported wood. Moreover, 2022 stood out in terms of the development and implementation of analysis methodologies to support the Institute's activities and requests from The Navigator Company and the sector in general, highlighting:

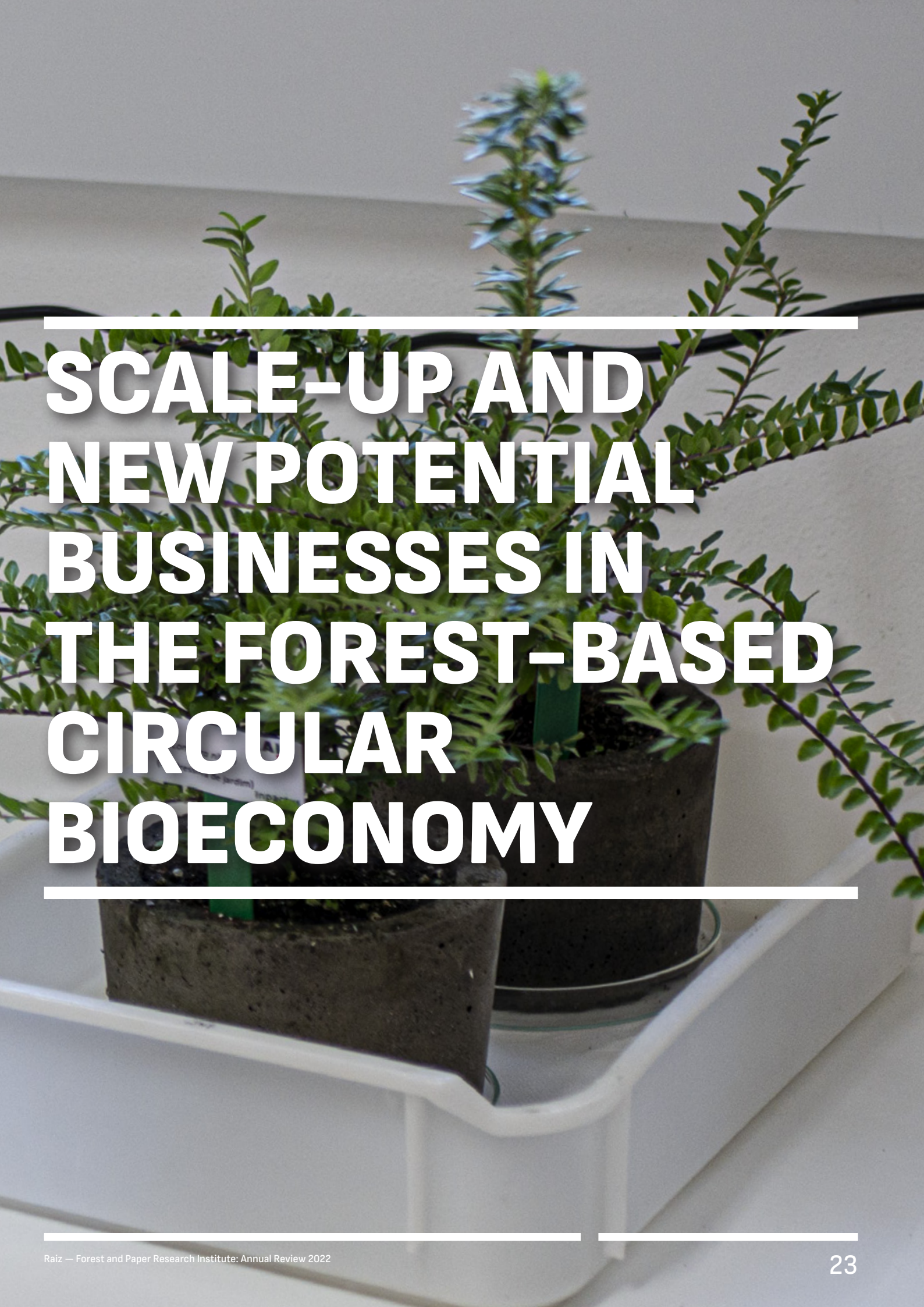
→ The development of analytical methodologies applied to pulp and paper samples intended for food contact (Food Contact Materials — FCM), for the identification of synthetic chemical substances (namely PFAS, plastics, additives, among others) with potential effects on human health and the environment.

→ Development of analytical methodologies using advanced analysis equipment (ion chromatography, gas chromatography, infrared spectroscopy and electron microscopy) to identify the presence of non-process elements, as well as constituents of process deposits and contamination in the finished product.



→ Quantification, by reference analytical methods, of the total organic carbon content in wastewater treated on a weekly or daily basis, for the purpose of calibrating sensors for continuous measurement, at the entrance/exit of the wastewater treatment. The monitoring of environmental parameters, on a continuous basis, in the context of the emission of pollutants into the water environment has assumed an increasingly important role in controlling the functioning of wastewater treatment plants, but also in the real impact that the adoption of innovative manufacturing technologies can provide in terms of the emission of these pollutants.





SCALE-UP AND NEW POTENTIAL BUSINESSES IN THE FOREST-BASED CIRCULAR BIOECONOMY

1



BIOCOMPOSITES

During 2022, the installation of equipment for the production of composites on a pilot scale was completed, increasing the pace of development of formulations resulting from the mixture of cellulose fibers with plastics of fossil origin and bioplastics. This installation aims to reduce the time-to-market for the application/use of these composites in injection companies, but also to explore new possibilities, such as applications in the textile area.

After starting up the equipment in the 2nd quarter, around 1000 kg of products have already been produced, sent for production/tests in plastic injection plants and R&D centres, from which opinions were gathered. The future development of these composites was part of two projects approved under the PRR. In the Bioeconomy component, the Be@t agenda (textile sector) and in the Business Innovation component, the From Fossil to Forest agenda for sustainable packaging solutions.

Tests were also carried out with physical pulp processing technologies (for incorporation into composites) and with alternative pulp drying technologies.

2



EUCALYPT EXTRACTS

Also in the 2nd 2022 quarter, with the support of Colab Bioref, the installation of the essential oil extraction equipment was completed. Since then, several tests have been carried out to identify the optimal extraction conditions, both in terms of the physical processing of the branches, productivity curve as a function of the number of days post-harvesting and extraction times. From these tests it was possible to collect a few tens of liters of essential oil, which have subsequently been used in internal projects as well as shared with RAIZ partners.

At the same time, the validation on a pilot scale of a sequential extraction process patented by RAIZ in 2021 was carried out, with the start of technical and economic evaluations.

The technical and economic viability of another 6 new processes or products resulting from the inactus project were further studied.





TECHNOLOGICAL SURVEILLANCE AND INDUSTRIAL PROPERTY

Technological surveillance continued, throughout 2022, to disclose information on technologies, processes and products in the areas of Forest, Pulp and Paper, Tissue, Packaging and Biorefinery developed and/or marketed by companies in these sectors, as well as by start-ups, universities and research centers, through 12 Newsletters on technological surveillance. These newsletters are issued monthly, and disclose, in a structured and informative way, the monthly relevant information.

This regularly published information is also the basis for the development of a digital tool, the Technological Radar, with funding from the Inov C+ Project, which will structure the compiled information and disseminate it in a user-friendly and visually appealing way, including some prospective analysis (Futures).

It was also possible to continue providing transversal support to different projects in the areas of product development, consultancy, research and technological and forest development, through on-demand technological surveillance activity, that is, the reporting of relevant information on technologies, processes and products of interest to the aforementioned areas. This aspect of the technological surveillance activity was completed with the analysis of industrial property rights associated with the products

and/or processes of identified third parties, in order to guarantee the free development of products and / or processes during the different R&D projects carried out by the research and technological development areas of RAIZ (freedom to operate).

Knowledge generated in different activities of the Research and Development projects that took place at RAIZ, and in collaboration with different Portuguese and International Academic partners, continued to be actively protected through industrial property rights, namely by filing national and international patent applications and/or European.

In addition to maintaining and expanding the jurisdictions (new international and European patent applications) included in RAIZ patent portfolio, currently with 38 active patent families, it was possible to submit 20 new patent applications, corresponding to new inventions resulting from the RAIZ's R&D activities in collaboration with National and International Universities. A record number with regard to the submission of national patent applications by RAIZ, allowing it's nomination as one of the institutions included in the ranking by the National Institute of Industrial Property of the most active entities

TECHNOLOGICAL SCOUTING NEWSLETTER November 2022



Huhtamaki & Nespresso

Huhtamaki has developed a proprietary breakthrough high-precision technology, allowing wood fibers to be molded into intricate shapes with high-precision tolerances to a fraction of a millimeter, to produce home-compostable paper-based coffee capsules for Nespresso.

The home compostable paper-based coffee capsules were launched by Nespresso in France this month.

The coffee capsules protect coffee quality and freshness while maintaining the required functionality.



Ancor & PulPac

Ancor has announced the investment of US\$3 million in PulPac, the Swedish start-up developing manufacturing technology for high-performance fiber-based packaging.

With PulPac's dry-molded fiber technology, Ancor expects to optimize the shape of products for a wide variety of applications, including some that have traditionally not been able to employ a viable sustainable option.



Solenis

Solenis has opened a new virtual international center allowing customers to participate remotely in lab-experiments.

The center is designed to simulate and test customer processes, treatment programs and paper/board properties to optimize performance, efficiency and costs while focusing on sustainability.

The new virtual center is available via a website portal where customers can interact and collaborate with Solenis experts remotely and in real time, for example while watching a live stream of pilot-scale equipment running lab trials in areas like packaging strength, digital print, barrier coatings and more.




Mondi

Mondi will support MOOVID, one of Europe's largest fashion enterprises, in switching from its standard rigid packaging, currently used in the distribution of the e-retailer's full collection of shoes, bags and clothes, to completely re-usable and recyclable paper bags available in three designs.

RAIZ

TECHNOLOGICAL SCOUTING NEWSLETTER January 2022




Stora Enso (Multicopy)

Stora Enso will be using the new EcoLam resin adhesive technology with a new dotting pattern application.

Using an adhesive dotting technology, instead of gluing whole lines in one, creates more attachment points, which enhances bond strength. If one glue dot breaks, the other ones will still hold the items together. In addition, each dot is flattened not 90 degrees, which creates a larger bonding surface area.


This application technology saves from 40 % up to 70 % of adhesive usage.



Nordic Paper

Nordic Paper and Kärntner Energi AG, Paper Province and Norbag are collaborating in the development of a completely new type of paper bag for residual waste. The new bag will have the potential to make waste management more efficient and sustainable, ensuring the occurrence of more bins since the paper bag can't be closed in the same way as a plastic bag, when used for residual waste in households.

The new paper bag will be suitable, significantly simplifying handling as the waste is not at risk of falling into the waste bin. This also means that the bins do not need to be cleaned as often. Shortly, some selected households in Sweden will be able to test it. The goal is to sell the bin in stores in 2022.




Storopack

Storopack, a German protective packaging producer, has developed the PAPERBUBBLER, an innovative and sustainable substitute for traditional air bubble film.

Storopack's PAPERBUBBLER product uses paper in combination with a specific developed format, PAPERBUBBLER paper sheets are suitable for shipping sensitive and small products such as cosmetics and electronic components as well as online mail order goods in general.

The product presents as pre-produced paper sheets with a perforation in the middle for flexibility for optimal protection of shipping goods.



SIG

SIG, a Switzerland based packaging company, has developed SIGNATURE, a seal to be for the world's first aluminum-free full barrier packaging materials for aseptic carton packs.

It complements SIG's range of already available products for glass, white milk, extending their applications to oxygen sensitive products, such as fruit juices, nectars, flavored milk or plant based beverages.

Not much more information is available, but this solution seems to be similar to others for SIG, which used ultra-thin polymer layers for containing and protecting the food products.

RAIZ

TECHNOLOGICAL SCOUTING NEWSLETTER May 2022



Suzano

Suzano has developed a model for forestry activities, named Topy, involving analytics, big data and artificial intelligence, for the evaluation of numerous scenarios to establish the best multiple forest allocation in best of variables such as temperature, rainfall, soil type and texture and altitude.

The tool additionally reduces the risk of possible environmental problems, including the incidence of pests and diseases.

To identify the best combination between costs and environment, simple data such as temperature, rainfall, altitude and soil type for each location are entered into the software. The algorithm then determines which class will produce the greatest amount of pulp per hectare/year.



Seppi

Seppi has developed a new translucent paper, branded as Crystallon, providing a recyclable and easy-to-use packaging solution for food and non-food applications.

Crystallon is an uncoated, compostable translucent paper, applicable whenever high barriers are not required, but where product mobility is important.

Usual possible applications are from modules and not to negative packaging, winning efficiency in envelopes or sales packaging for greeting cards.



Mondi

Mondi has developed the BCoolbox, a packaging system, a mono-material constructed by tough, lightweight corrugated sides and insulation panels, for keeping the contents protected and at 7°C for at least 24h.

The solution has already been tested by the company Time Food, allowing it to ship food all across the UK from one central kitchen.

The trial, conducted in control conditions with sensors implanted in the BCoolboxes, showed that meat arrived undamaged, unspoiled and cool with their contents never exceeding the critical 7°C limit. Shipping weight charges were also reduced due to the compact and lightweight composition of the packaging.



PulPac & HSMG

PulPac has partnered with HSMG, a company that has developed a patented technology, PROTEAR, for producing sustainable barrier coating formulations for water, oil and grease resistance, for the development of water and oil barriers for PulPac's Dry Molded Fiber technology that allows a thin, stretchable substrate to be applied during the forming process, helping to ensure the recyclability of molded fibre packaging used for applications like coffee cups.

The process results in a strong, recyclable, and biodegradable alternative to single-use plastic that works even for hot drinks.

Sweden's M&M buggies will be the first company to use coffee lids made with PulPac's Dry Molded Fiber and featuring the PROTEAR barrier solution.

RAIZ



in the protection of knowledge by national patent applications. During this year, 2022, six national patent applications were also granted, namely those that take into account a process for the production of xylooligosaccharides (XOS) from the alkaline filtrate of Kraft pulp of *Eucalyptus globulus*, a method for obtaining starch betainate and a process for the production of bacterial nanocellulose from lignocellulosic biomass of *Eucalyptus globulus*. 2022 was a great year in terms of scientific production, with a total of 82 publications.

Summary of the number of patent applications submitted during 2022

Project	inpactus
New Inventions: patent application (Portugal)	20
Patent Application International	3
Patent Application European	3
Applications Granted (Portugal)	6

Summary of 2022 Publications

Scientific Journals	35
Posters	25
Oral Communications	20
Book chapters	1
Technical Articles	1

Applicants for national patent applications with the highest number of applications in 2022

Entity (1 st applicant of the application)	Country	Total
1. Universidade de Aveiro	PT	33
2. Carbocode S.A.	PT	21
3. Raiz — Instituto de Investigação da Floresta e Papel	PT	20
4. Universidade de Coimbra	PT	19
Universidade do Minho	PT	19
5. Altice Labs, S.A.	PT	12
Centitvc — Centro de Nanotecnologia e Materiais Técnicos Funcionais e Inteligentes	PT	12

A group of children, seen from behind, are walking along a dirt path through a dense bamboo forest. They are wearing blue bucket hats and colorful vests (yellow, pink, blue, and red) over their regular clothes. The path is covered with fallen bamboo leaves and branches. The bamboo stalks are tall and thin, creating a natural canopy overhead. The scene is brightly lit, suggesting a sunny day.

PUBLIC AWARENESS AND SOCIAL RESPONSIBILITY

1

E-GLOBULUS PLATFORM

e-globulus (www.e-globulus.pt) is a platform developed by RAIZ that allows users to obtain a personalized technical recommendation, depending on the characteristics and location of their property. It is also a repository of news, events or novelties. It includes an online library with reports and technical manuals to support good management of the eucalypt forest. At the end of the year, the platform had around 15 thousand users (687 registered) and more than 63 thousand views.



2

FLORESTAS.PT PLATFORM AS A NATIONAL REFERENCE FOR FOREST INFORMATION

In the second year of operation, the Florestas.pt platform established itself as a national reference for forest data, images and information, with an average of 30.000 visitors/month. The success is due to the growing participation of specialists in various areas of interface with the forest (about 80 in 2022), who this year contributed with the recording of 11 Seminars (Academia), the writing of 19 articles

(Comentário), the revision and content contribution from different areas of expertise (eg soil study, natural areas, Spanish inventory, Technical use of fire, groundwater). The platform also saw its partnerships grow, with the adhesion of the FSC, PEFC Portugal, BCSD, CESAM, Forestis, and Floresta do Saber, which bring the total number of partnerships established to 18 (<https://florestas.pt/quem-somos/>).



Conhecer

Conhecer a floresta, os seus desafios, a importância da gestão e a relação com os recursos naturais.

Floresta Portuguesa
Desafios
Gestão Florestal
Recursos Naturais

Descobrir

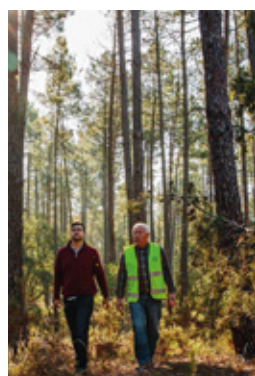
Um convite para descobrir as árvores com história, a paisagem florestal e muitos dos usos, saberes e sabores da nossa floresta.

Roteiros
Saberes e sabores
Árvores com história

Valorizar

Os indicadores que ajudam a determinar o valor social, económico e ambiental da floresta.

Sector Florestal
Produtos e Serviços
Inovação
Dimensão Social



Notícias e Agenda

Os acontecimentos e eventos que marcam a atualidade da floresta, da ciência ao lazer.

Academia

Seminários em vídeo, de cerca de 30 minutos, com especialistas, para refletir e conhecer o sector florestal.

Comentário

A opinião de personalidades convidadas sobre temas na ordem do dia.

Glossário

Desconstrução de conceitos e termos técnicos e científicos.

Saiba Mais

Mais de 100 perguntas e respostas, para saber mais sobre:

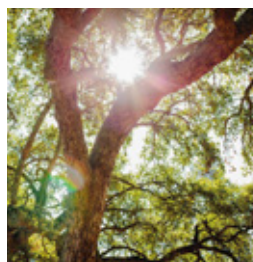
Alterações Climáticas
Biodiversidade
Bioeconomia
Certificação Florestal
Dinâmica Rural
Espécies Invasoras
Floresta Portuguesa
Gestão Florestal
Incêndios Rurais
Pragas e Doenças
Recursos Naturais
Valor da Floresta

Recursos de Conhecimento

Livros, manuais, relatórios e outras informações de apoio.

Equipas e projetos de I&D

Projetos a decorrer, ou concluídos, com envolvimento de equipas portuguesas.





«Bring Your Child to Work» initiative with the children of RAIZ employees exploring Quinta de São Francisco.

Quinta de São Francisco is a unique forest conservation area due to its richness in historical and natural heritage, which is managed by RAIZ. During 2022, the external areas and infrastructure were improved. In the field of dissemination and opening to the outside world, 2022 was a year of all records, as we received a total of 4.639 visitors at RAIZ and Quinta de São Francisco in 161 events. More than 90% of these visitors were teachers and students, from pre-primary to secondary education, who came to know the Floresta do Saber in particular.



Scouts camp at Quinta de São Francisco, with activities at the Floresta do Saber laboratory.



Centenary house of Jaime de Magalhães Lima, current base of the Floresta do Saber project.

QUINTA DE SÃO FRANCISCO AND THE FLORESTA DO SABER PROJECT

This project celebrated its first anniversary in 2022, continuing to expand its offer of activities adapted to different levels of education, in forest and/or laboratory environment. These activities are open to all civil society, but are especially aimed at the school community, and have the ultimate goal of contributing to the enhancement and protection of forests in Portugal. One of the new initiatives was Bring Your Child to Work, with the children of RAIZ employees being welcomed to Floresta do Saber during the summer holidays.

Throughout the year, around 6.500 visitors enjoyed 279 practical activities at Quinta de São Francisco and at external events, such as the Ecoaventura in the Municipality of Aveiro. The activities, were carried out in partnership with educational institutions such as the Professional School of Aveiro, various groups of local schools, companies such as Veolia and various scout groups in the region. There were also 6 think tanks and 3 exhibitions dedicated to the themes of the forest, biodiversity and bioproducts and a new

field leaflet “Most common Eucalyptus in Portugal” was produced. The cross country of the Eixo School Group was held at Quinta de São Francisco, and was attended by 650 students, teachers and the rest of the school community.

Through this project, we strengthened our relationship with the Aveiro City Council, bringing students of the Summer Club 2022 to us. All the activities offered by Floresta do Saber were made available in the City Council Educational Action Program PAEMA 2022-2023. The Municipality of Estarreja also brought all pre-school students to Floresta do Saber during the end of the school year.

In 2022, RAIZ also actively participated and provided scientific support to the new online platform, Biodiversidade by The Navigator Company, where people can get to know the biodiversity in forest ecosystems, especially those it manages.



Floresta do Saber in Ecoaventura 2022 of the Municipality of Aveiro.



Pre-school students in laboratory activities at Floresta do Saber.

A full-page photograph of a lush bamboo forest. A dirt path covered in fallen brown leaves leads from the bottom center towards the background, flanked by tall, slender bamboo stalks. The upper part of the image shows a dense canopy of green bamboo leaves, with some sunlight filtering through. The overall scene is vibrant and natural.

NATIONAL AND INTERNATIONAL COOPERATION

PRR — RECOVERY AND RESILIENCE PLAN

In 2022, four PRR agendas were launched, with the participation of RAIZ in the respective consortia.

Two of these Agendas were candidates for the PRR in component 5 — Mobilizing Agendas for Business Innovation. The Agenda FromFossil2Forest (sustainable solutions for alternative packaging to plastic), will be developed by a consortium of 27 entities with a total investment of 80M€. The second Mobilizing Agenda called TransForm, aimed at the digital transformation of the forestry sector towards a resilient and low-carbon economy, will be developed by a consortium made up of 57 partners with a total investment of €129M.

The other two Agendas are part of the PRR component dedicated to the Climate Transition dimension — component 12, aimed at reinforcing the Sustainable Bioeconomy, circular and carbon neutral which will be managed by the Environmental Fund. These Agendas are complete consortia and include the participation of business entities in the critical stages of the value chain of products or processes, based on biological resources. The first Agenda, called Be@t, addressed the priorities of the Textile and Clothing sector, with the participation of 54 entities and a total investment of €132M. The second Agenda called BioShoes4All was formed within the Footwear sector and had 68 partners and a total investment plan of €75M. The work plans for these two agendas started in June 2022.



INOV C+ (INTELLIGENT INNOVATION ECOSYSTEM OF THE CENTER REGION)

In the field of INOV C+, a project financed by the CCDRC, 2022 was a year marked by the first Think Tank on anticipating Futures and the Forest Technology Show in partnership with SerQ, on October 17, 2022, at Biocant Park. Procedures were launched to equip the co-creation space and the first co-creation program in Forest-Based and Digital Circular Bioeconomy was launched, based on synergies and complementarities with external SMEs and Startups, to promote the registration of new patents and licensing to third parties or the creation of new business and/or industrial joint ventures. For this purpose, 8 companies were selected with which we started working in 2022.



COOPERAÇÃO INTERNACIONAL

At the international level, in 2022, RAIZ continued the development of the BL2F project (Black Liquor to Fuel by efficient Hydro Thermal application integrated to Pulp Mill) in the area of biofuels for aviation as part of an international consortium led by TAU-University of Tampere (Finland) and with the participation of 9 other international entities, with a budget of €5M. A program to share knowledge and populations of natural enemies was initiated in 2022 between RAIZ and experts from FABI (Forestry and Agricultural Biotechnology Institute, University of Pretoria), Sappi (South African company) and Altri Florestal. This collaboration will allow to accelerate the study of *Enoggera reticulata*, a potential new parasitoid of trachymel.

RAIZ is involved in 27 financed national and international projects, in partnership with Universities, Research and Development Centers and Companies, 6 were initiated in 2022.

Applications Prepared/Submitted/Approved in 2022

R&D consortiums/ Financing Proposals	Submitted	Approved	Rejected	Under Evaluation
Total	6	5	0	1

Ongoing Projects in 2022

International Consortia R&D Projects	National Consortia R&D Projects	Infrastructure Financing	PRR Agendas	COLABS	Ongoing
2	15	3	4	3	27

Projects Contracted and Started in 2022

Acronym	Description	Lead promotor	Co-promoters	Total Investment
Proof of Concept Project <i>Shellution Plus</i>	Use of nanoporous eggshell in ink and paper fillers	IPN	OMYA, IPN, DEROVO, RAIZ	€150k
PRR Agenda <i>Be@t</i>	Bioeconomy for Textiles and Clothing	CITEVE	54	€138M
PRR Agenda <i>BioShoes4All</i>	Innovation and training in the footwear sector for a sustainable bioeconomy	CTCP	70	€75M
PRR Agenda <i>TransForm</i>	Digital transformation of the forestry sector for a resilient, low-carbon economy	Altri	57	€129M
PRR Agenda <i>FromFossil2Forest</i>	Development of cellulose-based packaging and products to replace fossil plastics	Navigator	27	€103M

EXTERNAL RECOGNITION AND CERTIFICATION

During 2022, RAIZ Institute renewed its recognitions: Eu-Bic, Unesco Club and CIT.

RAIZ, already recognized as a Technological Interface Center (CIT), in 2022 was recognized as a Technology and Innovation Center (CTIs), under the new legal regime for Technology and Innovation Centers established by the Science Law from 2016.



Membro da
Rede de
Associações e
Clubes para a
UNESCO



GOVERNANCE



GENERAL ASSEMBLY

Chairman

**António Pedro Gomes Paula
Neto Alves**

Secretary

**António Alexandre de Almeida
e Noronha da Cunha Reis**

BOARD OF DIRECTORS

Chairman

João Paulo Cabete Gonçalves Lé

General Executive Director

Carlos de Pascoal Neto

Members

**Adriano Augusto da Silva Silveira
João Paulo Araújo Oliveira
Nuno Miguel Moreira de Araújo
Santo**

Statutory Auditor

KPMG & Associados, SROC

Represented by:

Rui Filipe Dias Lopes
(ROC nº 1715)

SCIENTIFIC COUNCIL

Chairman

Júlio Pedrosa

Members

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Carlos Fiolhais
Clemente Pedro Nunes
Filipe Duarte Santos
João Coutinho Mendes
Francisco Gírio**

EXECUTIVE BOARD

General Director

Carlos de Pascoal Neto

Administrative and Technical Support Director

Leonor Guedes

Technological Research and Consulting Director

Ricardo Jorge

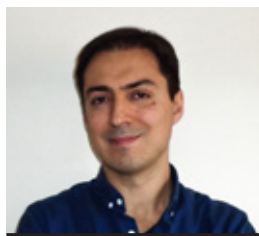
Forestry Research and Consulting Director

Nuno Borralho

EXECUTIVE TEAM



General Director
**Carlos de Pascoal
Neto**



Demonstration, Scale-
Up, New Businesses
Alexandre Gaspar



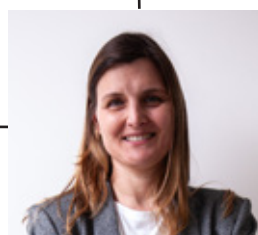
Technological Scouting
Mariana Oliveira



Forestry Research
And Consulting
Nuno Borralho



Administrative and
Technical Support
Leonor Guedes



Genetic R&D and
Forestry Consulting
Daniela Ferreira



Silviculture
Research
Sérgio Fabres



Outreach and
Strategic Projects
Cristina Marques



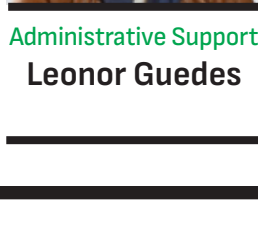
Administrative Support
Leonor Guedes



Forest Technical
Services
Cláudio Teixeira



Services and R&D
Laboratories
Manuela Marques



Technological
Research
Paula Pinto



Technological
Consulting
Luís Machado



Technological Research
and Consulting
Ricardo Jorge

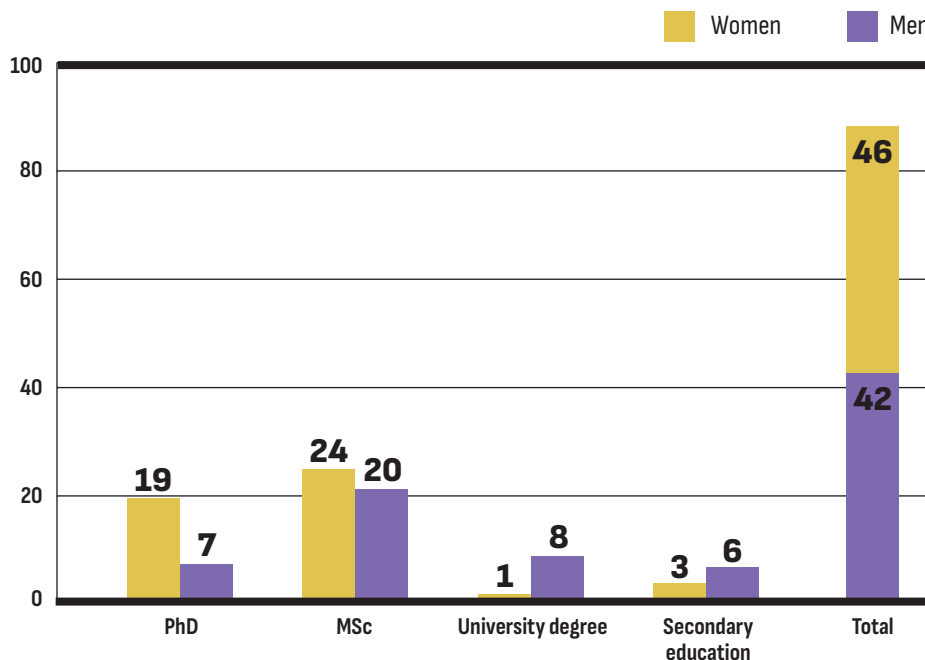


Administrative Support
Leonor Guedes

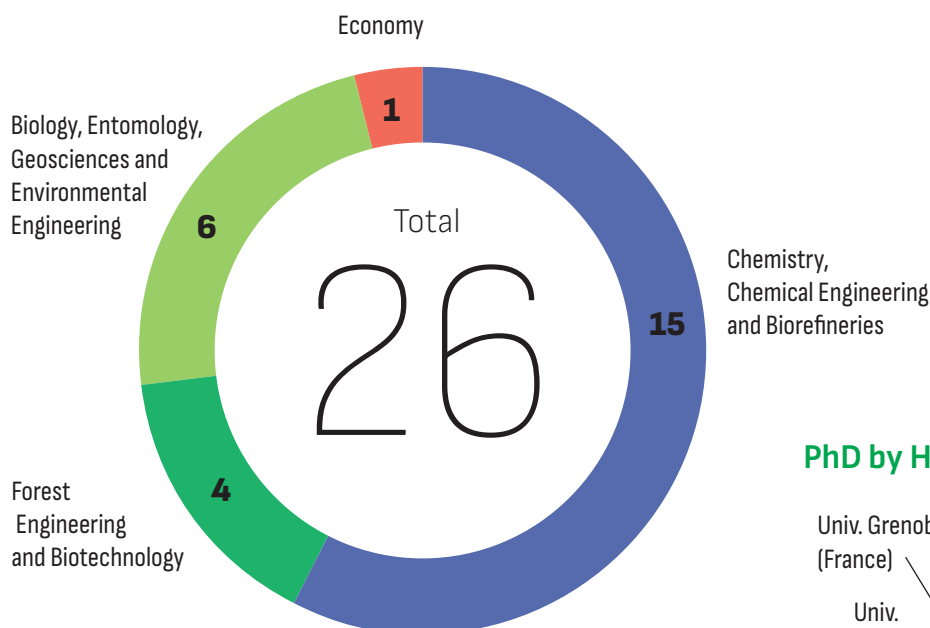
STAFF

The year 2022 marked the end of in-pactus. With a strategy of retaining the best talent, most of the Human Resources assigned to this project were integrated into other ongoing projects, in the PRR Agendas that have started in the meantime, which in many cases will continue the work carried out in in-pactus in industrial teams.

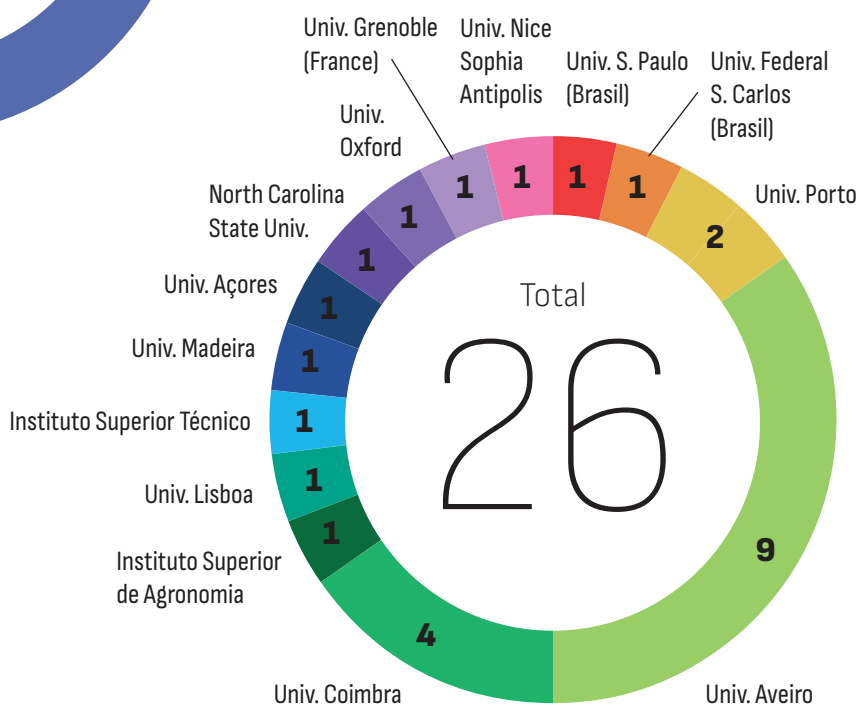
In December 2022, RAIZ's HR structure was as shown in the following graphs:



PhD by Scientific Domains



PhD by Higher Education Institutions



The “end of the pandemic” allowed for a return to normality, making it possible to bring people and teams together in the same physical space. The company maintained the teleworking option, up to two days a week, in order to allow flexibility and adjustment needed to return to the new reality.

This year, we highlight 19 Friday Seminars — events for communication and sharing of internal projects with colleagues, the Christmas dinner, a moment for the teams to get together at the Floresta do Saber space and the farewell dinners for some employees who worked at RAIZ for over 20–30 years.

RELEVANT FACTS OCCURRING AFTER THE END OF THE FINANCIAL YEAR

1

FUTURE PERSPECTIVES

No significant changes in the Company’s activity are expected for 2023.

2

BUSINESS BETWEEN THE COMPANY AND ITS DIRECTORS

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

3

PROPOSAL FOR APPROPRIATION OF RESULTS

The Direction of RAIZ — Forest and Paper Research Institute, proposes to its partners that the net result of the 2022 financial year, in the amount of €60.427, be taken to the retained earnings account.

The Direction

João Paulo Cabete Lé
Carlos de Pascoal Neto
Adriano Augusto da Silva Silveira
João Paulo Araújo Oliveira
Nuno Miguel Moreira de Araújo Santo

FINANCIAL STATEMENTS

Balance

Amount in €	Note	2022	2021
Asset			
Non-Current assets			
Tangible fixed assets	7	3 481 466	2 786 867
Intangible assets	8	32 006	16 199
Financial Investments — equity method	9	—	2 139 733
Financial investments — other	9	25 000	5 000
Other financial investments	11	29 512	23 719
Other receivables	13	3 438 320	—
Deferred income tax assets	12	77 000	115 500
		7 083 304	5 087 018
Current assets			
Costumers	13	2 418 897	20 415
State and other public entities	14	13 617	10 196
Other receivables	13	10 118 847	10 552 562
Cash and bank deposits	5	58 871	270 537
		12 610 232	10 853 710
Total Assets		19 693 536	15 940 728
Equity and Liabilities			
Equity			
Subscribed capital	15	9 000 000	9 000 000
Results carried forward	15	819 012	352 839
Adjustments/Other equity changes	15	1 561 844	1 009 188
		11 380 856	10 362 027
Net profit for the period		60 427	273 673
Total Equity		11 441 283	10 635 700
Liabilities			
Non current liabilities			
Provisions	19	32 740	—
Responsibilities for post-employment benefits	17	—	95 249
Liabilities for deferred taxes	12	628 015	406 130
		660 755	501 379
Current liabilities			
Suppliers	16	248 033	119 488
State and other public entities	14	656 709	118 368
Other payables	16	1 404 088	2 567 231
Deferrals	18	4 765 449	1 998 562
Financing obtained	16	517 219	—
		7 591 498	4 803 648
Total liabilities		8 252 253	5 305 028
Total equity capital and liability		19 693 536	15 940 728

Income Statements

Amount in €	Note	2022	2021
Sales and rendered services	20	6 061 664	4 479 213
Operational subsidies	21	1 116 484	2 045 742
Profit/(loss) incomes inputed by subsidiaries, associates and joint ventures	9	(9 520)	(30 525)
Supplies and external services	22	(1 344 976)	(1 597 014)
Staff costs	23	(5 257 885)	(4 390 485)
Other income	24	10 605	34 095
Other expenses	25	(52 872)	(64 889)
Income before depreciation, financing expenses and taxes		523 500	476 137
(Expenses)/reversals of depreciation and amortization	7	(264 787)	(175 657)
Trading income (before financing expenses and taxes)		258 713	300 480
Interest and similar income obtained	26	50 917	25 246
Similar interest and expenses incurred	26	(18 073)	(18 575)
Results before taxes		291 557	307 151
Income tax	12	(231 130)	(33 478)
Net profit		60 427	273 673

Economic and Non-Economic Activities

Amount in €	Activites		Sums
	Economic	Non Economic	
Costs	5 689 208	1 341 415	7 030 623
Current Activities	5 424 421		
Financed Projects		1 240 832	
Depreciation	264 787	100 583	
Incomes	6 105 113	1 217 067	7 322 180
Services Rendered to Clients	6 061 664		
Interests and similar incomes	32 844		
Other Incomes	10 605		
Subsidies			
for Operations		1 116 484	
for Investment		100 583	
Sums	415 905	-124 348	291 557





RAIZ



PART OF
THE NAVIGATOR
COMPANY

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