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Special for *O Papel*



## THE IMPORTANCE OF EMBRAPA FLORESTAS FOR THE FOREST BASE SECTOR

The Brazilian Agriculture and Cattle Raising Research Company (Embrapa) comprises several units with specialized research teams. One such unit is Embrapa Florestas, created in 1978 with the objective of contributing to the development and sustainability of the forestry agribusiness. Since then, the unit has been responsible for several milestones such as the adapting of pine and eucalyptus in the country with future interface in the improvement of other species.

Given the forest base sector's development, the institution's activities took on even more importance, going on to focus on much broader issues. At present, its research portfolio is pegged to issues of major relevance, such as climate change, energy forests, biorefineries and their various high added-value products, and increased forestry productivity for the competitiveness of certain market niches. All these items total 29 projects currently being studied by Embrapa Florestas and another 60 led by other research teams from other Embrapa units or other institutions. But the unit's work does not stop here. According to Edson Tadeu Iede, lead researcher at Embrapa Florestas, even though there has been considerable advancement in forestry technologies over the last years, there's still a lot to be done, from solving the well-known structural challenges to the democratization of knowledge on the part of rural producers, adjustments in the supply of commodities in the industry, adding value to forestry products through bioproducts and opportunities with energy forests. The interview below presents the perspectives and trends pointed out by Embrapa Florestas' lead researcher, Edson Tadeu Iede.

**Iede:** "In industry, we need to increase the complexity of the quality products we offer, do more than simply offer commodities, without forgetting that we are very efficient in their production. For example, go from selling wood and panels to selling industrialized homes; or else, sell market pulp, but also offer higher added-value products generated in our biorefineries."

**O Papel – Of the 29 projects that Embrapa Florestas is conducting, which is the most challenging and why?**

**Edson Tadeu Iede** – That's a difficult question. There are projects that are scientifically complex and relatively short-term such as, for example, the generation of products from black liquor. It's a global battle, with references yet to be built, but it's a 3-4-year project. The difficulty is that it's cutting-edge. There are others not so complex, such as the silviculture of eucalyptus material for energy production. However, they are medium term, and research continuity is always a major challenge due to oscillating funding.

Long-term research, in turn, is associated to silviculture and conservation of native species and forest restoration. To exemplify, our conservation and improvement actions of the *Araucaria angustifolia* species have been going on for 40 years and will continue to evolve. Lastly, projects of national reach are a major challenge due to their giant nature. Such is the case with the national forestry inventory, spearheaded by the Brazilian Forestry Service, in which we play a strong role in defining methodologies and training personnel: there are 8 million km<sup>2</sup> and it's impossible to do everything at the same time. The environments are many, the methodologies are complex and they need to be robust in order to allow comparing and also require flexibility, in order to encompass different forest typologies. This inventory example could also be applied to our Climate Change project, one of today's main global challenges.

**O Papel – How is Embrapa Florestas' interaction with the other units?**

**Iede** – Embrapa Florestas has an excellent relationship with the other Embrapa units and we develop research all over the country. For example, Embrapa has a Plantation-Cattle Raising-Forestry Integration project. In it, we work in partnership with the other units that research cattle raising and agricultural crops, as well as those that focus on the forestry area.

If we were to speak exclusively about forests, there are a series of units that also focus on the theme and are our partners. All eco-regional centers have a strong forestry action. Embrapa has encouraged us to establish multiple approximations aimed at solving complex regional, social and environmental problems. When we research agroenergy, for example, we need to think of forest product as one of the various energy generation resources with the possibility of complementarity and even mixing with other materials. It's possible, for example, to gasify wood and gasify chicken or pig manure, obtaining different gases, but that can be mixed in energy generation systems.

**O Papel – Embrapa was responsible for introducing and adapting eucalyptus and pine species. Does this process continue for other species? In your opinion, has the productivity (m<sup>3</sup>) obtained with these species reached a limit?**

**Iede** – We work with several native species, but perhaps the two species with a project similar to that which was done with pine and eucalyptus would be araucaria and yerba-mate. Of the two species, we have large basic populations and we develop improvement work. In other regions of Brazil, other Embrapa units are conducting some very interesting work with taxi, paricá and other species.

In our 40 years, we have studied around 300 different species. We have published books and other documents about silviculture, which are available through the Embrapa portal. None of them reach growth levels like pine and eucalyptus, but they grow well and can be part of higher-value wood production systems, and even be used in rebuilding legal reserves throughout Brazil. It's important to point out that in the Paris Agreement, the country committed to reforest 12 million additional hectares in the next decade. Part of this will be done with fast-growing forest species like pine and eucalyptus. Another part will occur in recovering legal reserves and areas of permanent preservation and this is where they can be a success.

With regards to pine and eucalyptus productivity, I believe there's still room to grow from a technology perspective, even among cutting-edge companies. There's considerable growth room beyond these companies, since a lot of people still harvest 20-30-40% less than them, be it due to less inputs or lack of technology. Therefore, there's room to improve our growth in volume. However, it's very important for us to also look at quality, with the development of appropriate materials for specific processes such as wood for sawmills that doesn't split.

Another point to think about is to what extent is it worthwhile to be intensive in inputs to increase plantation yield. The other day, a friend of mine who produces non-summer corn said he was changing his technology package from 110 to 80 sacks, because this off-season corn is a risky plantation in his area and his profit was almost the same producing 80 or 120 sacks. In the event of crop failure, he'd lose less money and, with this, have more peace of mind. I used this example just to show that, sometimes, producing less can be a safety strategy for planters. The same risk rationale can be applied to clonal forestry vs the adoption of seed materials in areas of risk.

**O Papel – How does research conducted in wood technology come into play in the productive sector? What is Embrapa's relationship with the forestry market's key players?**

**Iede** – We have always had a good relationship

with pulp and paper companies. In the past, Embrapa Florestas had cooperative genetic-conservation programs for pine and eucalyptus with active germplasm banks installed in various companies. This material comprised its improvement programs and is stored here in Colombo/PR, where our physical base is located, in the event it becomes interesting to rescue or utilize them again in new programs.

It is also important to point out our pest-control programs, for both pine and eucalyptus, always developed in partnerships with companies and usually developed due to a problem that afflicts and reduces their competitiveness. We've always talked about the wood wasp program, but today a much more important project of ours in this area is the Integrated Management of Pests for leafcutter ants that attack pine trees. In the forest management area, based on forest management information from companies, we built the simulation software applications, *Sispinus* and *Siseucalyptus*, which are used by a large base of companies in their models.

All these projects are very interesting and have something in common: they were developed with companies and for companies. That's why they work. We are now working with the biorefinery philosophy: adding maximum value and developing several products based on the same raw material, in different "anchor-industries".

In the 1980s and 1990s, we worked a lot with wood quality to support our genetic improvement programs. Today, the pulp industry produces black liquor and we are researching ways to use this liquor preferably with high value-added products. One of the challenges in this, for example, is finding out whether it's possible to take fractions of black liquor and produce biocides to be used in the MDF industry in substitution of products banned abroad.

We also seek new ways to use market products: is it possible and economically viable to produce artificial skin from nanocellulose? We already know it's possible, and now we need to study its cost-effectiveness. Our technology area of forestry products is reasonably new, but we maintain good relations with several companies, both pulp and paper, as well as in the energy area. Suzano, for example, helped us in a CNPQ project focused on the use of lignin and was a very positive experience.

***O Papel – Embrapa possesses a research network in energy forests, which aims to expand the country's energy matrix through the use of technologies for using forestry biomass. What can you say about the current scenario and advancements of this research network? Which is the most promising technology/research developed/targeted by the agency for this theme?***

**Iede** – We're working with energy forests through projects that range from seed to processing. There's an ongoing project to use wood gasification for distributed generation of electrical energy. This is an interesting alternative for forest owners, especially in areas where wood prices are very low.

Distributed generation allows you to "sell" (perhaps the best term would be "share") energy at the retail market-price of electricity. Today, an urban consumer pays R\$0.65/kWh and a forester could supply this energy at a slightly lower price and in a non-bureaucratic transaction, in the form of an association between a forest biomass energy producer and an energy consumer.

This distributed generation is a very interesting alternative for sawmills, since 50% of the raw material becomes waste and can be transformed in electricity. Today, there's new equipment that allow generating electricity in scales of dozens of KW and without the use of boilers. The fact is that we are beginning studies in this area and we partner with companies interested in this.

***O Papel – Embrapa recently established an agreement with Benson Hills to increase genetic variability through gene editing. What is the advantage of technology offered by the company? Is this technology already applied in species like eucalyptus and pine abroad? Do you intend to apply this technology on these species?***

**Iede** – This agreement is recent and was established through an initiative by the soy area. We have not yet discussed how we can benefit from the agreement and bring this technology to eucalyptus and pine.

***O Papel – What to expect from new trends in forest technology research? When we compare Brazil to other countries, how competitive are we?***

**Iede** – In the 90s, a Finnish company Indufor, in partnership with STCP, did a benchmarking study between Brazil and Finland. The study concluded that Brazil had several comparative advantages, but that competitive advantages were mostly on the Finnish side. We are slowly changing this situation and getting closer to European markets. Our challenge is to be competitive with the comparative advantages we have.

We have evolved a lot already and gained space in the international market. Take our pulp as an example of success. In the field, one of the main challenges is to democratize knowledge of big producers and forest research centers among the mass of independent producers. We still need to worry about markets and organize ourselves in order for wood production to be a profitable activity.

In industry, we need to increase the complexity of the quality products we offer, do more than simply offer commodities, without forgetting that we are very efficient in their production. For example, go from selling wood and panels to selling industrialized homes; or else, sell market pulp, but also offer higher added-value products generated in our biorefineries, be it from our own pulp or industrial waste.

In 2019, in partnership with Brazil's Forestry Service, EsalqUSP, the Federal University of Viçosa (UFV) and the Federal University of Paraná (UFPR), we will be promoting the IUFRO World Congress 2019. It's a unique opportunity to showcase our technologies and discuss with the world what we're doing and show the competence of our forest sector with its sustainable and socially just high-productivity silviculture.

Our country has everything to become a global forestry reference: we have the land, silviculture knowledge and experience. Clearly, we need to overcome several structural and cultural problems and we also need better long-term planning in the sector where silviculture and industrial growth are considered in an articulated and harmonious manner. Besides overcoming infrastructure barriers, we still have enormous tariff complexity, an unclear issue regarding the benefits and harms of forests, among other things. But all this is healthy to us. It's a sign that there's a lot of work and growth opportunity ahead. ■