

Connection between soil and economy of plateaus of Santa Catarina

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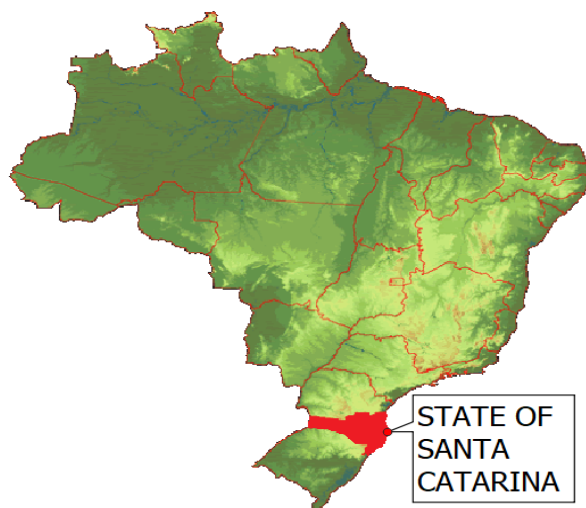
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Abstract: Economic development in agriculture based regions, as well as on other adjacent industries, is greatly dependent on the characteristics of the soil, and what it has that can be extracted by the people working on it. This article aims to better point down what aspects of the different soils in the southern-brazilian state of Santa Catarina have impacted the differing agricultural and economical developments in its multiple geographical sectors. The analysis of multiple studies regarding both agricultural practices, their economical impact, and the geological origins and soil properties in each region of the state were followed by comparison between works. It's concluded that under poorer soil conditions, its preferred and most economically impactful use is of silviculture and fruit cultivation, that being long-cycled plants. The better the soil conditions, the more impacted its region's economy are by growth of short-cycled cultivars, such as grain, or even usage of the farmable area to grow livestock, swine and birds. Notably, all mentioned activities occurring in the regions in wich they are not the most economically relevant are mostly performed by smaller, family run farms as subsistence or secondary income.

Keywords. Soil analysis, Brazilian economics, Geology, Santa Catarina, Agriculture.

1. Introduction



Santa Catarina is a state in the Southern Region of Brazil, and presents many geological formations that present a fundamental part on the type of soil that occurs on the region and in the choice of economical activities performed by its people. One way of classification is by the different plateaus that occur throughout the state, seen often in official reports (EPAGRI, 1999). To achieve said classification, the following soil properties are analysed: geological formation of origin, texture, CEC (Cation Exchange Capacity), bases saturation, drainage, depth of horizons, topography, etc. The properties these give to the soil interfere directly with choosing what economic activity will take place in a specific area, and in the productive response that the soil will present to the chosen activity.

Fig. 1 - Hilight in red of Santa Catarina in the map of Brazil.

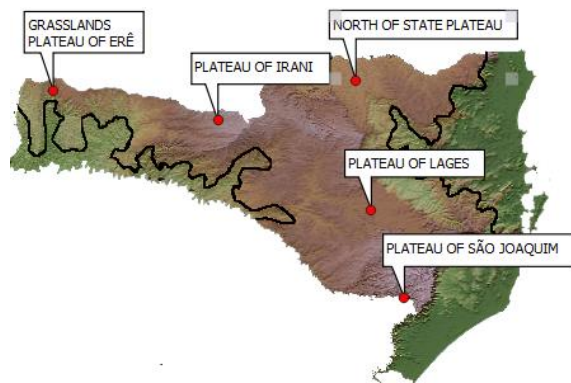


Fig. 2 - Names and locations of each of Santa Catarina's plateaus.

Given that Santa Catarina is divided into multiple sections with differing economic developments and soil characteristics in each, a study of each section's soil and main businesses is needed to better determine the existing connection between the two.

2. Methodology

This article was built with bibliographic research and comparison of data provided by national research centers (EPAGRI, EMBRAPA) and work by individual researchers. The studies and reports compared are of two kinds: works analysing the economy in each of the state's sections and their most prominent cities, with different suggestions of socioeconomic division to the state; and research on the soil, its origins and properties, on relevant regions.

The regions of Santa Catarina are divided according to the geological system of the plateaus, each with its most prominent soil types. These soils and their characteristics are discussed based on the Brazilian System of Soils Classification official terminology, developed by EMBRAPA in 1999. Equivalent nomenclature in the World Reference Base for Soil Resources international taxonomic basis is provided for comparison.

3. Results

3.1 Plateau of Lages

The Plateau of Lages is found in the Mountain Chains mesoregion, and is made by the counties of Lages, Rio Rufino, Bom Retiro and Urubici. This plateau houses the largest Hydrographic Region in the state, containing the basins of Canoas River and Pelotas River, of which both merge to form the Uruguai River. Drainage provided by these interferes in the development of the terrain of the state, which originates from the rock of Sedimentary Basin of Paraná and of the Serra Geral geological formation (Peluso, 1991).

As for soil, most is composed of Neossolo Lítico (Entisol) and Cambissolo Háplico (Inceptisol), which amounts to low natural fertility and high acidity, usually explored for pasture, reforestation and low

impact, subsistence cultivation of maize, soybean and beans, even if technical recommendations for the area limit its soil usage to commercial reforestation or conservation of natural forests (Santos et Al., 2018). It is shallow, its horizons don't stretch further than 50cm deep each.

There is, then, coherence between the type of soil and its use in this region, given that 43,5% of the cultivable area is occupied, of which an inexpressible portion is used for agriculture: fruit growing, maize and pasture for livestock. The true focus of this region is commercial reforestation with strains of *Pinus* and *Eucalyptus* (EPAGRI).

3.2 Plateau of São Joaquim

Localized near the Plateau of Lages, it's composed by the counties of São Joaquim, Coxilha Rica, Campo Belo do Sul and Bom Jardim da Serra. The rock formations and soil are similar to that of the Plateau of Lages, with the main difference being economical: stronger practice of fruit growing, especially of pears, grapes and apples (Town hall of São Joaquim). Silviculture still has an important, though smaller impact on the region.

3.3 North of State Plateau

The North of state Plateau is composed by the counties of Bela Vista do Toldo, Campo Alegre, Canoinhas, Iriéópolis, Itaiópolis, Mafra, Major Vieira, Monte Castelo, Papanduva, Porto União, Rio Negrinho, São Bento do Sul e Três Barras. The dominant topography is of the Patamar de Mafra, characterized with low colins and a regular surface, being mainly flat. Scattered, river plains occur alongside the valleys of Negro River and Iguaçú River, the most important rivers of the Plateau Drainage Basin (Tomporoski, 2016). Soils present are mostly Cambissolo Háplico (Inceptisols), which are shallow, have variable natural fertility, great percentage of rocks.

As in Mountain Chains mesoregion, there is focus in silviculture and forestry, mainly for cellulose extraction and furniture manufacturing wood (Andrejow et AL., 2018). The rocky, shallow, and acidic ground makes working and preparing the dirt for cultivars of annual or biannual cycles (such as maize, soybeans or greenery) too expensive and ineffective, as the acidity halts secondary root and root hair growth, and the high and rocky ground don't accommodate them greatly. Those characteristics, however, have little effect on the growth of *Pinus* and *Eucalyptus*, which makes these prone for cultivation and exploration in the region.

3.4 Plateau of Irani

The Plateau of Irani is localized in the West of state mesoregion, specifically in the High Valley of Peixe River and High Irani (EPAGRI). Its most important counties are Campos Novos, Joaçaba and Treze Tílias (Pesenti, n/d). Its geology is composed predominantly by the Serra Geral Formation, which was formed by the spilling of basalt over the

Botocatu Sandstone Formation (Becker, 2014). The soil here reflects its origins by being overly represented in Cambissolo Háplico (Inceptisol). There is, however, a great presence of Nitossolo Vermelho (Oxisol), colloquially known as “Terra Roxa”, or “Purple Dirt”. This soil type is common in basalt planes and characterizes a clayey structure with well developed aggregates. This guarantees a good and moderately lasting response to chemical treatments addressing its non ideal natural fertility and nutrition (EMBRAPA, 2018). Consequently, agriculture in the area is poignant, mainly in grain production, such as maize and soybean. According to EPAGRI, more than 50% of the production of grain in Santa Catarina comes from the microregions within this plateau of Joaçaba, Campos de Lages and Chapecó.

3.5 Grasslands plateau of Erê

Inserted in the microregion of the Northwest of state, it is, as the other areas of the West of state, part of the Serra Geral Formation, presenting the same types of soil to Plateau of Irani. The main counties of the region are Chapecó and Xanxerê (EPAGRI, 1999).

As previously mentioned, the presence of Nitossolo Vermelho (Oxisol) eases the practice of agriculture, which gives this region prominence in the state’s grain production. A standout from Plateau of Irani is, however, the agroindustrial business, such that the two main counties are national leaders in the production of swine and bird meat. There’s notable presence of multiple important international corporations exporting this meat globally (Pertile, 2008). There is a notable trend of abandonment of fields previously used for agriculture in favour of transforming them in livestock farms since 1985 (Pereira, 2007).

4. Conclusion

After analysing both the soil characteristics in the plateaus and the economic activities their people perform using their soil, clear connections can be established. In Santa Catarina, regions with soil of: considerable shallowness; short horizons; rocky horizons; low natural fertility; and high acidity, develop soil usage majorly focused on silviculture of Pinus and Eucalyptus, and minorly focused in fruit trees growing. Biannual and annual cultivation of grains, vegetables or greenery is reserved mostly for subsistence and smaller familiar farms. Such regions are those in the Plateaus of Lages, São Joaquim and North of state.

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5.1 Pictures

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