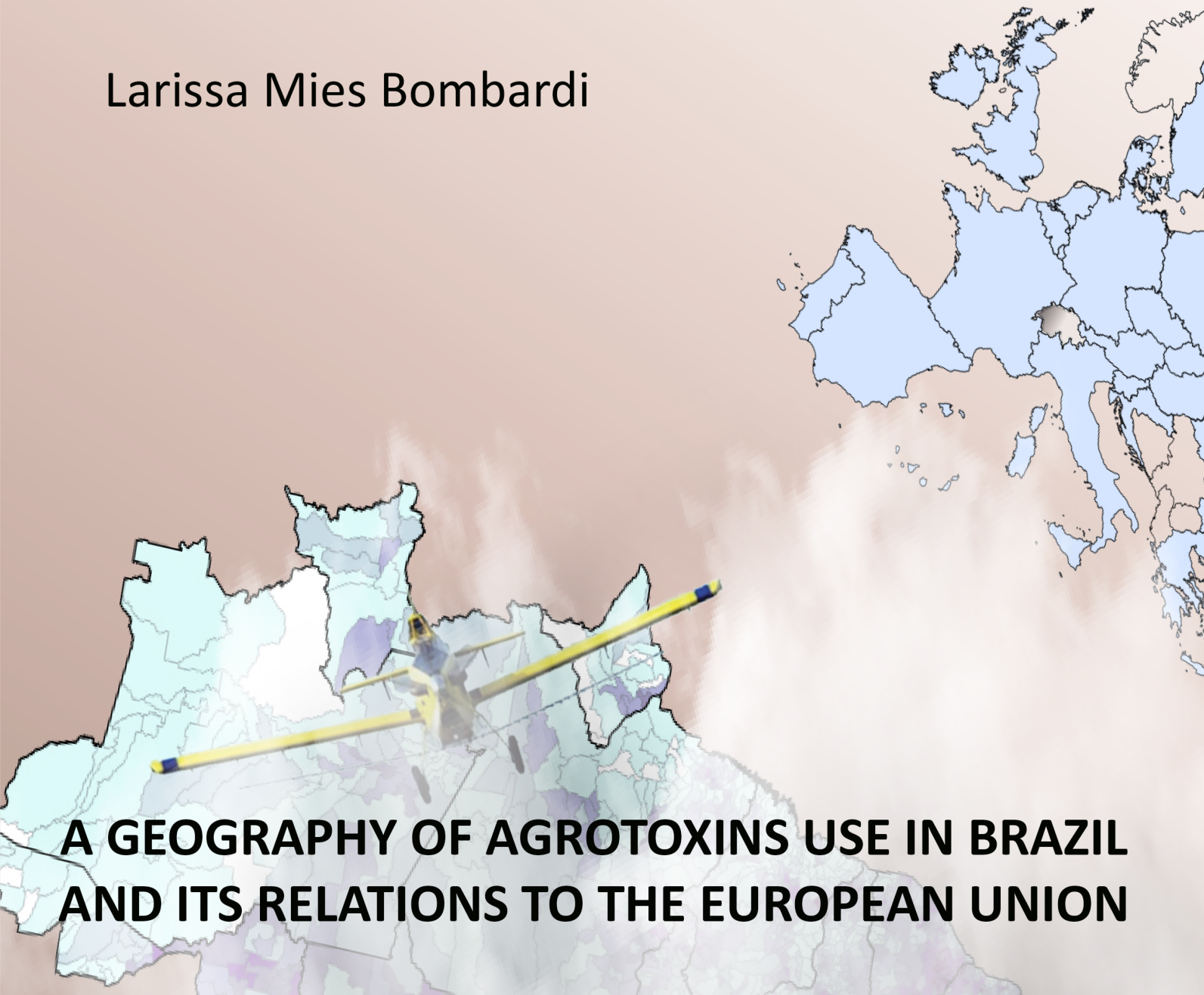
Larissa Mies Bombardi



A GEOGRAPHY OF AGROTOXINS USE IN BRAZIL AND ITS RELATIONS TO THE EUROPEAN UNION

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FOREWORD

There is a seepage, generations old. One that began with the enclosures of England that made tenants, servants or martyrs of rural people, the clearances of Scottish Highlands that replaced families with sheep, filled the front line of colonial armies with the dispossessed and banished the rest. A seepage that told the Irish to go to Hell or Connaught, the stoniest part of the world's first colony where Atlantic winds whipped the thinnest of soils. The seepage then polluted that large ocean as powers vied for advantage against the elements, ships and guns poised against nature itself, progress branded on the backs of the enslaved. Modernity meant murder, development meant savagery, science was racism, salvation meant sickness. Populations were condemned by decisions made continents away.

The soil on which I stand now is a strange place in the 21st century. Geographically it is part of old and new empires; Britain, the European Union. Our people speak in an inherited tongue, their language banished, yet a tongue that cannot speak the truth without memory. Their eyes betray a restlessness, a deep knowing that things are not well. Swept into a modernity that draws deep lines across young faces, people are not thankful, but unwell. And amidst the growing confusion of messages, media, technology, media, most days we are unable to put a finger on why.

In the 21st century, then, all is not well.

What this remarkable piece of work, a work of courage, from Larissa Mies Bombardi allows us to do, however, is put a finger on an often intangible, hidden, often elusive truth. That which is not well and that seeps into our air, our streams, our soil, our homes, our veins can be named. It is branded. It is marketed and its sale foisted upon poor farmers. Its names are in English, French, German. These names have seeped from laboratories of Washington, London, Paris and Berlin, along the corridors short sighted government, past unscrupulous scientists trained to

focus on immediate problems and not global crises. Patents are granted to manufacturers who live far from the women, men and children whose lives, experiences, frustrations, aspirations lie behind the dramatic statistics that are presented by these maps. Patents return profit to each new product whose sole design is to kill. Fung-'icide', herb-'icide', insect-'icide', pest-'icide'. The suffix 'icide' has the literal meaning 'to kill'. Must we now add hom-icide, infant-icide, su-icide, popul-icide to the achievements of these chemicals that seep from the airplanes, from the hilltop to the river, from the tanks carried on poorly paid shoulders to the clothes, homes and gardens of those labourers, from the city to aldeia, from the factory and onto our plates? Condemned by decisions made continents away.

As Carlos Walter Porto-Gonçalves reminds us, the European Union has not prohibited substances that are known to be dangerous, merely their consumption within their own borders. Indeed it exports it, sells it. Revenues are generated, gross domestic product values enhanced by the success of the new heroes of biotechnology, of grain supply, of agroenergy. We are asked to believe that hunger, climate change, poverty can be addressed by the same interests that have caused them. It requires the mythmaking of 'sustainable development' and the 'green economy' on a global scale to convince us of the supposed merits of corporations who are synonymous with world wars, outright fraud, exploitation and environmental catastrophe. It requires their clever use of market certification to conceal the harsh realities that are emerging in Larissa's work. The authorities wash their hands of the toxicity, let it drain elsewhere, seep into the homes of others far away. Populations condemned by decisions continents away.

Why is it that as these toxins permeate down through the soils of the Amazon tributaries and the Guarani aquifer that conflict continues to erupts from these same sources? Could it be that the populations in each new region of extraction, cultivation and exploitation have always known what science is beginning to show: that 'value added' through agroindustrial expansion means a 'net subtraction' for them. The peasant, the landless, the indigenous, the African descendants, the rural labourer have been, as Jack Kloppenburg emphasises, subsidising western lifestyles for centuries. They have provided 'aid' to distant, urban populations in the form of underpriced foods, land, labour and ultimately profit for corporations. All this while their humble lifestyle have provided a counterbalance to the flamboyance of the wealthy; 80% of the world's population keeping the world spinning by consuming less than one quarter of its wealth. The maps here make visible, make graphic, what they know, what their stories have recounted. Peasants who watch their garden fruits change colour and die, and stand in the corner of their field with a white rag to ward off encroaching planes. School children are rushed to hospital after the plane passed. Mothers are concerned about washing their work clothes at home after carrying 11 litre chemical tanks through the plantation, their pay capped by convulsions. Populations cursed not by their distance from development, but their proximity to it.

Herbicides are designed to attack surrounding organisms until there is but one preferred plant left standing. A logic inherited from their manufacturers, and that is consistent with

capitalism. Attack competitors, destroy dissenters until those fascistic words, 'There is no alternative', sit above the barcodes of each new toxin on the market, and accompany the basic food packages delivered to the poor on the city periphery. The alarming number of human deaths we find on the proceeding pages accompany a further, symbolic death. Each sickened community, each poisoned field, each polluted watercourse threatens to extinguish an alternative variety of life. The memory of another way perishes along with the disappearance of those who have worked the land. This much I know from the abandoned fields of Connaught. The means of providing food safely, sustainably, ecologically are as diverse as the seeds guarded by traditional communities, as diverse as their cultural celebrations linked so closely to soil and solar cycle. This much I have learned from the people of Brazil.

Larissa's work is, therefore, not merely a Brazilian concern. Just as Brazil's history and transatlantic trade cannot be disassociated from early European industrialisation and early days of empire, its massive role in international food and agroenergy trade mean that the moral, ethical and political questions raised by her research are a global concern. The seepage from laboratory to crop, field to factory and back on to the plates of our families makes the evidence more difficult to ignore. The extent that decision makers may attempt to do so remains to be seen, but the Atlas of Agrotoxins means that the excuse that 'we did not know' collapses under the weight of this book.

Brian Garvey
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University of Strathclyde, Glasgow

INTRODUCTION

This Atlas is the result of a study carried out in recent years and dedicated to the issue of agrotoxins. Having developed two postdoctoral researches was essential to conclude this work. The first one (2014-2015) was supervised by Professor Carlos Walter Porto-Gonçalves, at Universidade Federal Fluminense, in Niterói, state of Rio de Janeiro, Brazil, and the second one (2016-2017 was pursued at Strathclyde University, in Glasgow, Scotland, under the supervision of Professor Brian Garvey.

I should mention that both grants were crucial to the successful conclusion of this Atlas. For my post-doctorate at Universidade Federal Fluminense I was granted a scholarship by CAPES PNPD – PROEX; and to study at Strathclyde University I was approved for a scholarship by BPE – FAPESP, process number 2016/05506-8.

The opportunity of delving into a research theme is becoming scarcer in the academic reality of Brazilian universities. The requirements of a high productivity within increasingly shorter deadlines – characteristics that are also present in the capitalist agriculture –are imposed on us along with demands for "on-line" work and infinite reports. The time necessary to build a work of erudition – a classical example of which would be Antonio Candido's Os Parceiros do Rio Bonito – is often robbed from our routine.

In this context, I had two important examples of the art of "spending one's time" on something: Carlos Walter Porto-Gonçalves, who coordinates a research lab called LEMTO and elaborates thoroughly each reading he does, and Brian Garvey, whose personal routine shows the importance of cherishing life in a larger sense: in which family, music, friends and solidarity giver meaning to everything.

In Scotland with Brian Garvey and Juliana Busnelo-Garvey I had one of the most beau-

tiful lessons in generosity! Something I had experienced before only among peasants. I will be forever thankful to them for that. The fact that our children grew together for some time in the wonderful village of Drymen will remain forever in my memory. The music circles will be equally unforgettable and some of the songs will always be part of the "soundtrack" to special moments.

I am also very thankful to each one of my colleagues in the Department of Geography at USP, who did the hard work on my behalf while I was absent. Such a mutual support is so important. Special thanks go to Rita de Cássia Ariza da Cruz and Marta Inês Medeiros Marques, my colleagues in the Human Geography Graduate Program – USP, who supported this work and allowed it to develop I should also thank Professor Antonio Carlos Colangelo, head of the Department of Geography at USP, who in addition to institutional support offered me a great personal assistance

Despite being an advocate for a slow pace of life, I consider that this research is only the beginning of a larger journey. A journey full of obstacles imposed both by the "modern" academic life and by the condition of being a mother in "modernity", forced to submit to an exclusively male style of life and work and neglect the cycles of childhood and maternity. In any case, it was urgent to publish this first reflection on the meaning of food and agriculture at the present stage of capitalism and its accompanying maps, which we hope will be an important instrument of knowledge about the reality of agrotoxins use in Brazil as well as its connections to the European Union.

Some people gave me special incentive during the development of this work, among which stand out Professor Ariovaldo Umbelino de Oliveira and Professor Rita de Cássia Ariza da Cruz. Rita is a close friend and confident at all moments. Also crucial was the support of my children's Brazilian teachers: Helena Dias and Marta Martins. Fairy godmothers. Barbara Schwair Nogueira and Gustavo Sarraf Nogueira were important personal references and supporters at all moments. My friend Thomaz Jensen was and continues to be a major articulator and stimulator of the divulgation of this Atlas.

Professor Maria Elena Simielli's collaboration was fundamental to guide the elaboration of the maps, she is undoubtedly a great Brazilian reference in cartography.

People with whom I had the opportunity to live in Scotland turned our living together into a friendly experience at several moments. Among them I highlight, together with Professor Brian Garvey, his select group: professors Brian Wynne, Kendra Briken, Paul Stewart, Paul Tuohy, Mike Danson, and Kathryn Burnett as well as researchers Francis Vinicius Portes Virginio, Russell Pepper, and Joanne Macfarlane. Professor Brian Wynne offered a fundamental support by welcoming me sometimes at his lovely house and discussing relevant aspects of this work, besides creating new research links.

Equally fond are the memories of Jimmy, Shane and Alister, who made our experience humane and fun. I thank Francis Virginio for his help with the preface and his support, along with Jéssica Enara's, through many experiences in Scotland. I would like to thank Maja and David

for their kindness and support. Other people in Scotland, beyond our academic circle, were very special. Among them I highlight Juliana Busnelo-Garvey, Lesley, and Maria Casteel and Louise (Drymen Shop). I have learned many lessons with the four of them! Throughout this trajectory I also had a very special gift from life, which was the chance to meet Professor Kendra Broken, who became a very close friend. I am constantly amazed by the harmony and warmth of this bond. I am very thankful for having met her.

My great friends Mariana Paschoal, Fernanda Silvestro, and Carolina Bueno have kept my heart warm. My parents, even at distance, never ceased to offer all forms of help and support. May the memory of my father allow his availability and high spirits to be elements forever present. Finally, I will be forever thankful to Edu, whose special and peculiar perfectionism and dedication made this Atlas possible. Without him this work could not have been accomplished.

It may be said that a research never comes to an end, and it is not different with this one. I hope that the content of this Atlas helps us to construct a new pact of sociability, one in which a part of humanity is not abandoned. A sociability in which nature is not conceived as a natural resource, one in which food has its meaning restituted and not reduced to the condition of commodity and agroenergy. A sociability in which the e(E)arth is fecundated with human work, one in which we are able to rescue Ariadne's thread by seeking the meaning of food and nourishment to humanity. A sociability in which the production of food is not a potential form of life destruction.

ARIADNE'S THREAD: A REFLECTION ON THE FEMALE ARCHETYPE AND THE USE OF AGROTOXINS IN AGRICULTURE

I. PREAMBLE

In Greek mythology, after killing the Minotaur and thus saving the population of Crete, Theseus can only find his way out of the labyrinth by means of a thread given him by Ariadne. This is the essence of the myth of Ariadne's thread. As Leonardo Boff points out in his work *Essential Care*, "myths do not have an author. They belong to the common knowledge of humanity, and are preserved by the collective unconscious in the form of major symbols, archetypes and exemplary figures" (BOFF, L., 2008, p. 18).

The myth of Ariadne's thread is used in this work as a metaphor to stimulate a reflection on the feminine archetype and its meaning for current agriculture. The reflection starts with a linguistic fact: in several Western languages, the same word can refer to our planet and to the soil: *Earth* in English, *Terra* in Portuguese and Italian, *Tierra* in Spanish, *Terre* in French, *Erde* in German. In languages that have grammatical genders, such as Romance languages, but also in German, the term is a feminine word. And this feminine noun reveals a dual identity: as humus, meaning the reproduction of life; and also as the locus of human existence.

In an archetypal perspective, humanity (*humus*) fertilizes the earth with human labor through agriculture. Still in this perspective, the first food that every human being receives at birth is milk. Milk does not exist in the plant kingdom, it is not synthetized either. It is eminently a feminine food, as it is produced by the female mammals in our planet. Humanity has perpetuated itself for many thousands of years through that first food which is produced by the woman's body.

Consequently, women are carriers of life not only for giving birth, but for feeding their

children with food produced by their own bodies. In Portuguese, one of the main expressions for "giving birth" is "dar à luz", something like "to deliver to light". The image has a strong significance that could be extended to our planet, since the Earth gives birth when a seed sprouts – seeds emerge in search for light. Therefore, a mother feeds her children with milk produced by her body, as well as mother Earth feeds her children in many ways[1].

If breast milk is such a complete, nutrient-laden food that does not cease, is generous and feeds the early years of humanity, then it translates the principle of Earth with capital E: carrier of life, generous giver of incessant, abundant and complete nutrition. Food is therefore always associated with the human condition – which is inevitably connected to the planet – and to the feminine scope or archetype. A reflection on food undoubtedly leads to a reflection on the female archetype principle.

Klass and Ellen Woortmann carried out an anthropological study on peasantry entitled '*O Trabalho da Terra*' (The work of the land) (WOORTMANN, and WOORTMANN, K., 1997) in which they distinguish these male and female archetype principles in the context of the peasant labor. The male principle is constantly facing outwards and focusing on what is external, while the female principle is concentrated on an inner movement. The peasant man traditionally deals with external dangerous scenarios – the forest[2], venomous animals and the mysteries of the woods. The peasant woman, in turn, endures internal mysteries: the danger of the body, a body which bleeds cyclically, childbirth etc.

The authors highlight the peasant woman in her work environment, engaged in her inward tasks of feeding the family, working the land close to home, raising small animals.

The peasant family work of cultivating the land involves a complementarity between the male and the female archetypes[3], thus fecundating the earth and even enriching it! However,

1 Commenting on the fact that Latin-American countries were the first to include the rights of Nature in their constitutions, Leonardo Boff affirms that "The new Latin American constitutionalists unite two currents: one, the more ancestral, is that of the original Nations, for whom the Earth (Pacha) is mother (Mama), hence the name, Pachamama, and is entitled to rights because she is alive and gives us all that we need, and, in the end, because we are part of and belong to her, in the same way as the animals, woods, jungles, waters, mountains and landscape. (BOFF, 2013).

2 On this subject, see Tedesco, L.C. 1999.

3 This does not always necessarily mean that the feminine archetype is exclusively linked to women and vice versa. It is not uncommon for peasants to perform tasks that are not "matched" to their gender. The perspective of "Caring" is the core of peasant labor, irrespective of genders and their associated activities.

In this sense, it is important to consider that the "reproduction of life" is central to peasant tasks, and that for peasants their work is not devoid of meaning. Differently from what happens in the processes of proletarianization, peasants are not alienated from the product of their work, even because it belongs to them.

Carlos Rodrigues Brandão in O Afeto da Terra (The Affection of the Earth) states that: "In a very generalized way, little girls, young, adult and elderly women are the social agents of pity. They are the ones who usually and openly show pity and declare that "feeling pity" is the motive of a great part of their initiatives to protect life, especially regarding the integrity of humans […] and animals' rights to life and freedom. They are the ones that feel moved, without hiding their feelings, by the suffering of an animal or when they witness a male act of violence against any animal. " (BRANDÃO, 1999, p. 75)

In this work we seek to make a reflection on aspects of feminine and masculine archetypes, which is different from the discussion of gender, although they are not mutually excluding. In this respect Maria Eulina

with the current globalization of agriculture and advance of capitalism, the Earth with a capital E and its female principle of bearing life, of giving birth, is being archetypally subjected to a *masculinization process*, which is very different from fecundation.

By being fecundated through the cultivation of food, it (the Earth or the earth) gives birth. It is, notwithstanding, being subjected to masculinization as the food it produces by this mechanism of expanded reproduction of capital, is being directly transformed into *commodities*, either to feed other *commodities* (birds and swine, for example[4]) or to provide energy. Therefore, when food (quintessentially the female principle) degenerates into a commodity devoid of meaning – or use value – we then face a process of sterilization of the earth in its broader sense.

What is being currently experienced is a unique moment of capitalist cultures, particularly regarding commodities and crops aimed at energy production. In this scenario, earth is a common good that meets the demands of capital, but not the demands of human beings Thus, in an archetypical interpretation of this process, we confront sterilization. The male principle alone does not fecundate the earth but makes it sterile. If fertilized, the earth gives birth, but if only subjected to masculinization, it is sterilized.

In a direction opposite to that of (E)earth sterilization, we find peasant agriculture, peasant resistance, Indigenous and *Quilombola*[5] agricultures in Brazil, as well as diversified peasant and indigenous practices worldwide.

II. THE OUTER END OF THE THREAD: BRAZIL AND THE CURRENT INTERNATIONAL DIVISION OF LABOR

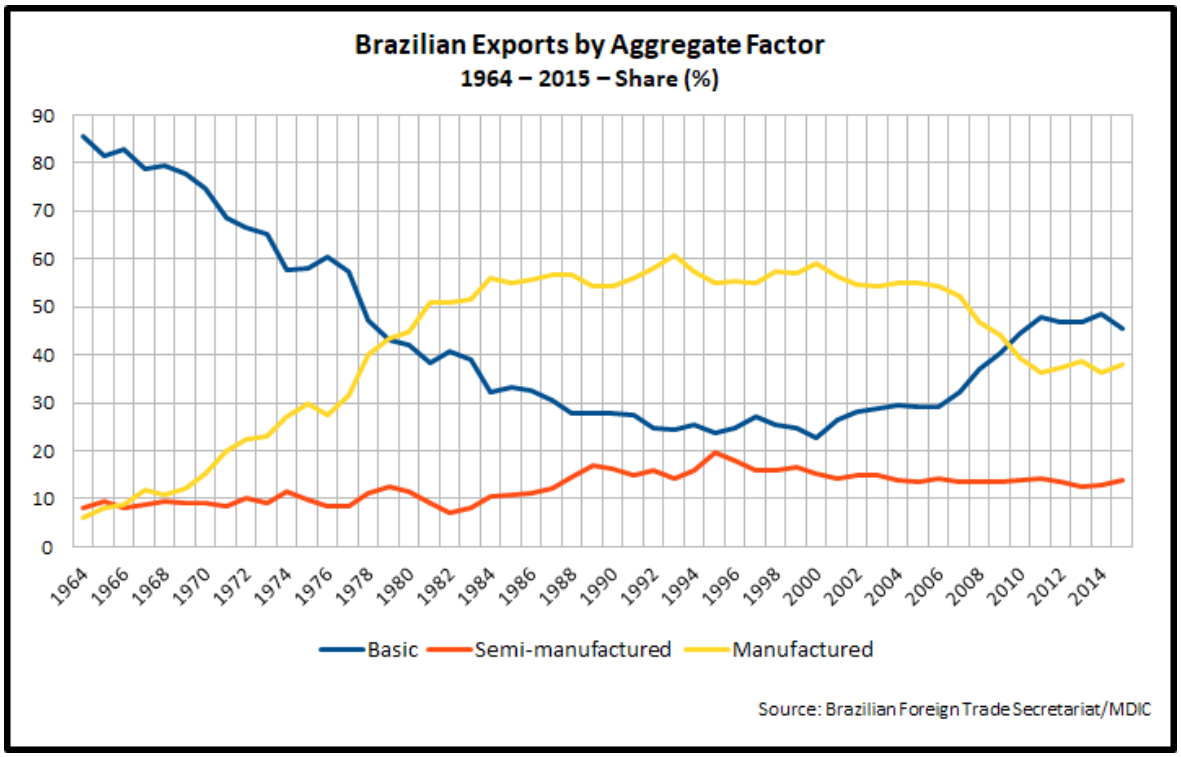
Eduardo Galeano, one of the honorees of the International Symposium of Agricultural Geography of 2015, opens one of his most famous works, "*As veias abertas da América Latina*" *(Latin America's Open Veins)* by stating that the international division of labor means that some countries specialize in winning and others specialize in losing; and that, very precociously, Latin America specialized in losing (Galeano, 2010). Chart 1 presents some data that illustrate this interpretation regarding the place of Latin America in the International Division of Labor, and specifically indicates the current point of insertion of Brazil in the global economy.

Pessoa de Carvalho asserts that gender can be defined as "the educational, cultural, social, and historical construction of notions of masculinity and femininity that are opposite and dichotomous, asymmetrical and hierarchical, based on a binary sexual differentiation. This construction is implied in relations of power, of sexist/male and heterosexist domination, and affects:

- individuals, their bodies, their identities, subjectivities and habitus;
- the social and symbolic order, the division of labor (both horizontal and vertical), spaces and objects, their representations, meanings and values, and social and cultural practices (androcentric, patriarchal, heteronormative)"(CARVALHO, M.E.P. de 2017, p. 17).

4 See NEGRÃO, 2008.

5 Quilombola agriculture is agriculture practiced by Brazilian blacks who escaped from captivity and gathered in independent and fortified communities called Quilombos.



From 1964 to 2015, Chart 1 depicts two clear inversions of trends between basic goods (blue line) and manufactured ones (yellow line). During the military dictatorship (1964-1981), we observe a decrease in the share of basic products in Brazilian exports, and an increase in manufactured products until 1979, when the two lines cross and take opposite directions. Since then and until the early 2000s, these lines remained opposite

However, from 2006 on, the lines resume their prior tendency, with a decrease in the share of manufactured goods and an increase in the share of basic ones in exports. Finally, between 2009 and 2010, the lines cross-again and, in 2014/2015, they resume the prior trend of the early 2000s, revealing a greater importance of basic goods as compared to manufactured ones in exports. It should be emphasized that, in 2014, the exports of basic goods correspondent to nearly 50% of the country's total-exports.

Unraveling the numbers behind the lines, we find that in 1979, basic goods represented around 43% of Brazilian exports, semi-manufactured 12.4%, and manufactured, 43.6%. In 2000, the exports of basic goods reached 22%, its lowest level in the whole historical series, whereas semi-manufactured goods corresponded to 15.4% and manufactured goods to 59%. However, just over a decade after, such scenario was reversed, for in 2014, basic goods represented 48.7% of total exports (which is more than in 1979), semi-manufactured goods accounted for 12.9%, and manufactured goods, 36.3%.

According to Brazil's Ministry of Development, Industry and Commerce (MDIC)[6], the ten

6http://www.mdic.gov.br/index.php/comercio-exterior/estatisticas-de-comercio-exterior/balanca-comercial-brasileira-acumulado-do-ano?layout=edit&id=2205

most exported items in 2016 were: 'soy, whether or not broken' in the first place, which corresponded to 10.44% of the total, mainly destined to China, Spain, and Thailand, in descending order. The second most exported item was 'Iron ores and concentrates' which accounted for 7.17% of the total, principally destined to China, Japan, and the Netherlands, also in descending order. In the third place appeared 'crude oils', which represented 5.44% of the exports, whose three major destinations were China, Uruguay and the United States. The fourth most exported item was 'raw sugar cane', corresponding to 4.47% of the total, being India, China, and Algeria the main purchasers. In fifth appeared 'frozen, fresh or chilled chicken meat, including giblets', which represented 3.21% of total exports, whose major buyers were Saudi Arabia, China, and Japan. In sixth, 'cellulose' corresponded to 3.01% of the exports, and was destined mainly to China, the United States, and the Netherlands (Holland). In seventh, 'soy bran and residues' accounted for 2.8% of total exports, destined mainly to the Netherlands (Holland), France, and Thailand. In eighth, 'raw coffee grain', responded for 2.61% of the total Brazilian exports, and was mainly destined to Germany, the United States, and Italy. In ninth, 'passenger cars' accounted for 2.52% of the exports and its major buyers were Argentina, Mexico, and the United States. Finally, in tenth, 'frozen, fresh or chilled bovine meat' accounted for 2.35% of the total exports and was mainly destined to Hong Kong, China, and Egypt.

Among the ten most exported Brazilian products are soy, sugar, chicken meat, soy bran, bovine meat, cellulose, and coffee beans. That is, seven out of the ten most exported goods in Brazil (as percentage of total exports value) are agricultural products, with soy appearing either as bean – thus as a basic good (the first in the exports agenda) – or as 'bran and residues from soybean oil', a semi-manufactured product.

China emerges as the main purchaser of the four most exported goods (soy, iron ore, crude oils, and cellulose) and the second major buyer of the three most exported goods (sugar, chicken meat and bovine meat). Some European Union countries also appear with significance along with Japan and the Middle East countries. We highlight that, even if there has been a change in the main countries to which the major part of Brazilian goods is exported, it is worth considering the permanence and renewal of the importance of agricultural products in the total of Brazilian exports. Therefore, we should reflect on the place of Brazil in the global economy, especially taking into account the current role of China, which, in addition to being a great importer of these products, has increased its relevance as a producer of agrochemicals[7].

European Union countries (especially Spain, Italy, France, Holland, Belgium, and Germany) are among the ten major buyers of seven out of the ten main products exported by Brazil, namely: soy, iron ore, crude oils, cellulose, soy bran and residues, raw coffee beans, and bovine meat. We highlight that in 2013 soybean was Brazil's second most exported item, and stepped up to be the first in 2016. Such increase reveals the growing importance of agricultural goods to

7 For instance, in reference to the acquisition of Syngenta by Chemchina, see https://g1.globo.com/economia/negocios/noticia/chemchina-completa-a-compra-da-syngenta-por-us-43-bilhoes.ghtml

the Brazilian exports agenda, which is backed by an exponential increase in the cultivation and/or raising these "products".

The term "product" is used in this work because it is indeed about commodities devoid of their use value, in Marxian terms (1982). Use value refers to the physical, intrinsic property of an object which, in the case of food, is lost, transmuted, when transformed into commodity, that is, into a type of merchandise that – beyond its characteristic as nourishment – can be be negotiated in the global market as any other item would. By becoming a commodity, or even energy, food is deprived of its use value, or disfigured in its main primary vocation as human nourishment. In this sense, the definition of commodity presented on the website of Brazil's MDIC is very enlightening:

> Commodity (...) is a term from the English language (plural: commodities) meaning merchandise. It is used in commercial transactions of products of primary origin in commodity exchanges.
>
> The term is used to refer to basic raw products (raw material) or products with a small-degree of industrialization, of an almost uniform quality and produced in large amounts by different producers. These "*in natura*" products, cultivated or from mineral extraction, can be stocked for a certain period without significant quality loss. Their pricing and marketability are globally measured by commodity exchanges[8]

The last phrase in the definition of commodity is emblematic: "Their pricing and marketability are globally measured by commodity exchanges", as it expresses food less and less as nourishment, and increasingly as a commodity or as a source for the so-called "agroenergy".

Resuming the archetype parameters, the quintessentially female principle, which is contained in every food, is replaced by an absolutely male principle. This process is embedded in the logic of global capital, in which agriculture plays a specific role and in this sense, according to Oliveira (2012, p. 6):

> ...under the global monopolistic capitalism, agriculture came to rest on three pillars: the production of commodities, transactions carried out on the commodities and futures exchange, and global monopolies. Firstly, it aimed at transforming the whole agricultural, forestry and extractive production into commodities for the global market. Therefore, the production of foods ceased to be a national strategic issue to become a commodity purchased in the world market wherever it is produced.

Brazil is currently the world's main sugar exporter[9], the second major ethanol producer[10]

8 Available at: http://www.desenvolvimento.gov.br/sitio/interna/interna.php?area=5&menu=1955&refr=608 (access on 05/05/2015).

9 Available at: http://revistagloborural.globo.com/Colunas/bruno-blecher/noticia/2017/08/brasil-e-o-maior-exportador-mundial-de-acucar.html (access on 09/17/2017)

10 Available at: http://www.anp.gov.br/wwwanp/images/publicacoes/Anuario_Estatistico_ANP_2016.pdf (access on 09/17/2017)

(from sugarcane) and, over the past few years, became also the first or second leading soybean[11] exporter and the second largest corn exporter[12]. Nonetheless, it imported, for example, both ethanol[13] and corn[14] in 2016.

Now, if Brazil imports items of which it is the main exporter, this implies that the logic of production is related to an internationalized mechanism. This fact uncovers, therefore, a logic that is opposite to that of food and national sovereignty, be it related to food or energy.

According to Conab (Brazilian National Supply Company), these cultures have largely increased over the past decade or so. As Charts 2 and 3 below depict, in 2002, the soybean planted area was 18 million hectares, which rose to 33 million hectares in 2015/6, corresponding to an increase of 79% over 13 years. As for sugarcane, in 2005/6, the planted area was of 5.8 million hectares and it rose to 8.6 million hectares in 2015/6, revealing an increase of 48% over ten years. Regarding the amount of production, soybean had an increase of 84%, a number that is very close to the expansion of the planted area, which means that such an increase is more related to an area expansion than to productivity gains. This is supported by the productivity bars at the center of Chart 2, which indicated little alteration in productivity levels. Sugarcane, in turn, presented a production increase of 54%, and a somewhat larger percentage rise in the planted area, which means that in addition to the increase in production resulting from the expansion in its planted area, there also occurred a small productivity gain (Chart 3).

Chart 2

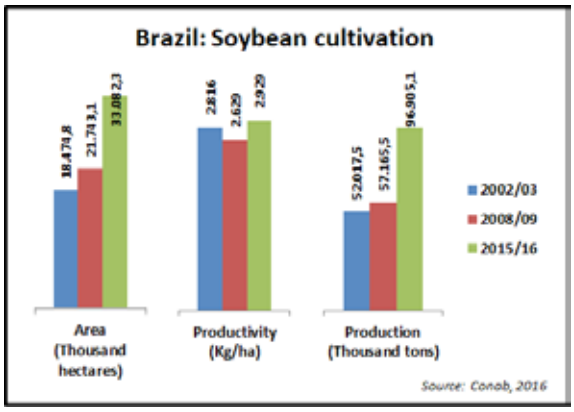
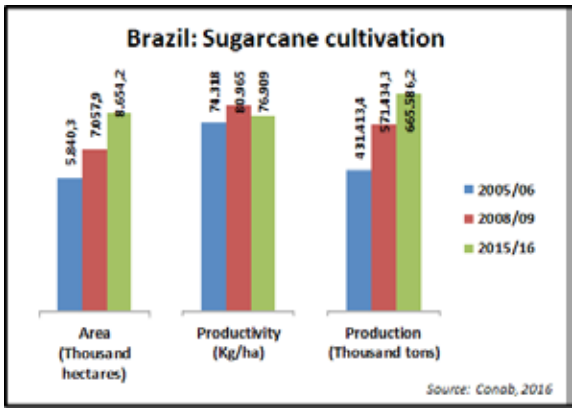


Chart 3



11 Available at: http://www.gazetadopovo.com.br/agronegocio/colunistas/giovani-ferreira/brasil-perde-o-posto-de-maior-exportador-de-soybean-do-mundo-a5v5x389lhmqg7yapc5zh89fx (access on 09/17/2017)

We highlight that even though the USA production had been larger than Brazil's regarding the harvest of 2016/2017, respectively 117.2 million tons and 113.9 million tons, the planted area with soybean in Brazil is larger than in the USA. The planted area in the USA (harvest 2016/2017) was 33.482 million hectares, while the correspondent Brazilian area was 33.890 million hectares. Information available at: https://www.embrapa.br/soybean/cultivos/soybean1/dados-economicos (access in 09/17/2017)

12 Available at: http://www.fiesp.com.br/indices-pesquisas-e-publicacoes/safra-mundial-de-milho-2/attachment/boletim_milho_setembro2017/ (access on 09/25/2017)

13 Available at: http://g1.globo.com/economia/agronegocios/noticia/2016/08/brasil-importa-etanol-dos-eua-em-plena-safra-do-centro-sul-20160804152011782452.html (access on 09/17/2017)

14 Available at: http://www.canelrural.com.br/noticias/milho/brasil-deve-importar-milhoes-toneladas-milho-2015-2016-61911 (access on 09/17/2017)

Although the size (in hectares) of these cultivated fields indicates the dimension of the occupied area, (e.g., by soybean, corn and Brazilian sugarcane), it does not reflect the magnitude of such scenario. The maps in the Infographic Section of this Atlas show the extension of these cultivated areas. They compare sugarcane, soybean and eucalyptus cultivated areas in Brazil and the land area of some European Union countries.

The area cultivated with eucalyptus in Brazil (7.4 million hectares) corresponds to 80% of Portugal's land area (almost a Portugal of eucalyptuses), to 90% of Scotland's, and amounts to 2.4 times of Belgium's territory. As for sugarcane (10.5 million hectares cultivated in Brazil), the crop area corresponds to 1.1 times the area of Portugal, 1.3 times that of Scotland and 3.5 times the territorial size of Belgium. Lastly, the soybean Brazilian planted area is 33.2 million hectares and corresponds to 3.6 times Portugal's land area, 4.2 times Scotland's and 10.9 times Belgium's. In spatial terms, this is the dimension of the area occupied by these crops in Brazil: it may reach 10 times the territorial areas of some European countries.

If we sum up the areas planted with sugarcane, soybean and eucalyptus in Brazil, it would correspond to five times the land area of Portugal, six times that of Scotland, and 16 times that of Belgium. This is the dimension of monoculture in Brazil. In contrast to such an expansion in areas with crops notably commodity-oriented, we have witnessed a decline in the area with crops dedicated to feed the population.

According to the Brazilian Ministry of Social Development (MDS)[15] the Brazilian market basket is composed of four fundamental foods with slight regional differences. For the Center South region, foods composing the basket include rice, beans, wheat flour, and pasta (wheat), while for the North and Northeast regions foods are rice, beans, cassava flour, and pasta (wheat).

Chart 4

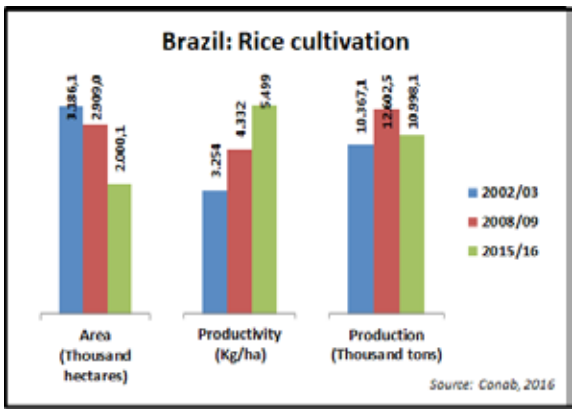
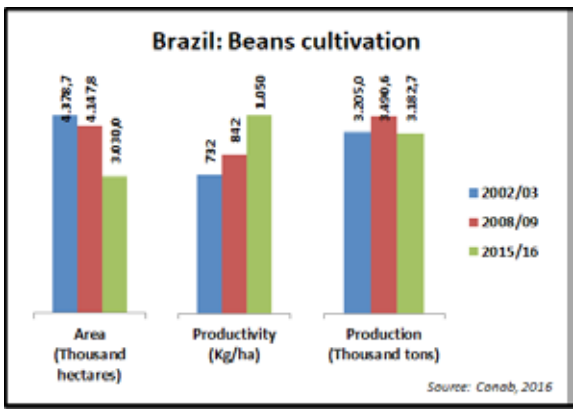


Chart 5



15 Available at: http://mds.gov.br/assuntos/seguranca-alimentar/direito-a-alimentacao/cestas-de-alimentos/composicao-das-cestas-de-alimentos

Chart 6

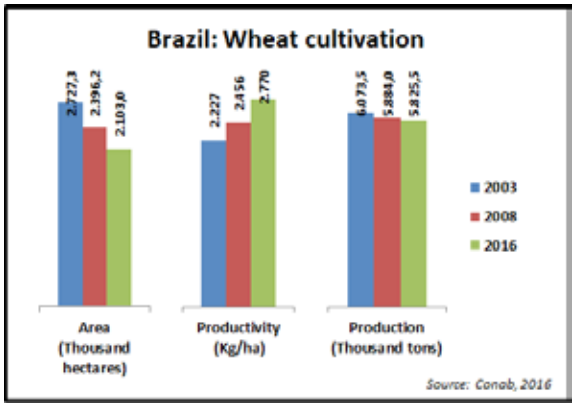


Chart 7

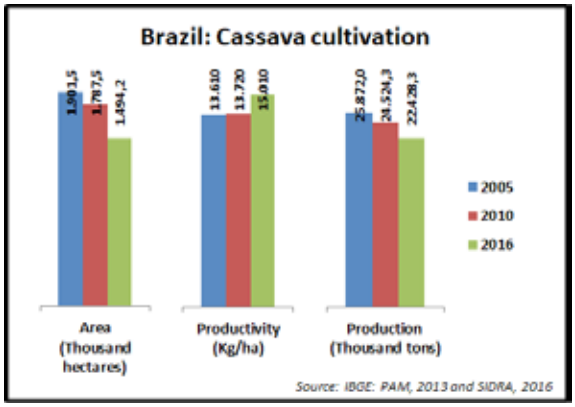
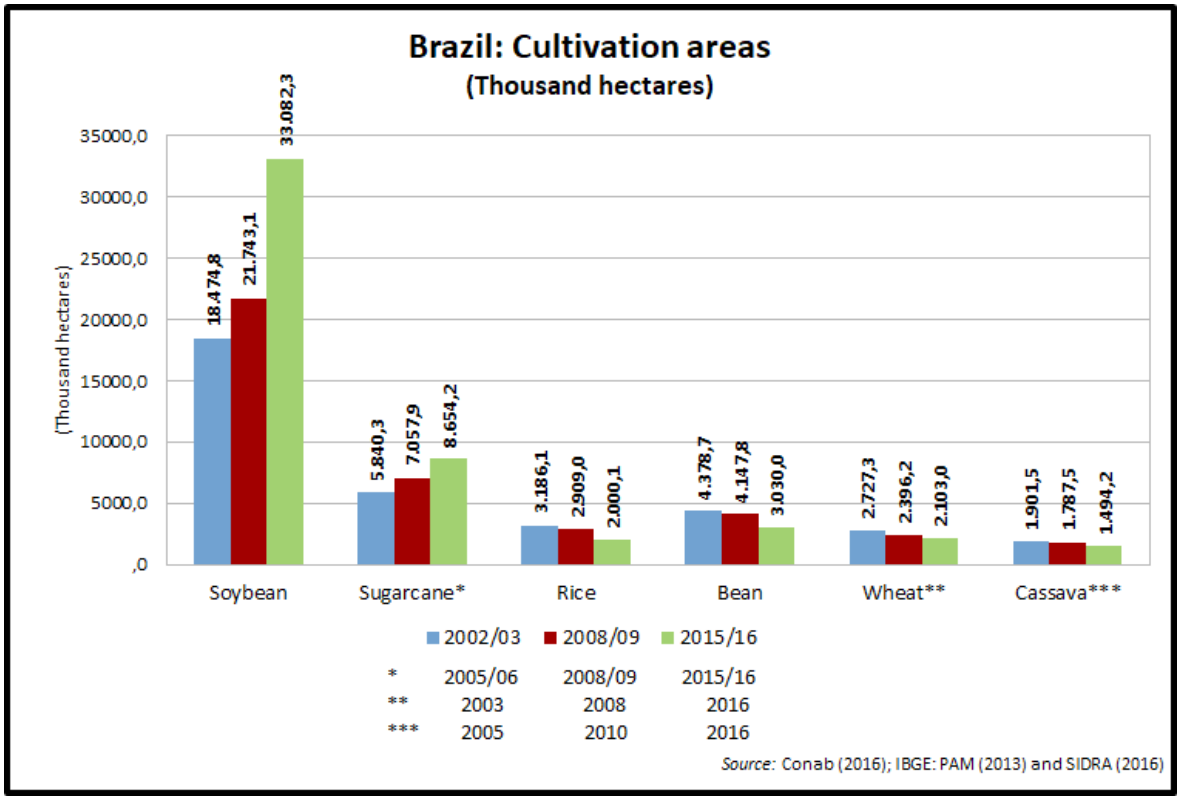


Chart 8



As Chart 8 indicates, data on rice, beans, wheat and cassava revealed an opposite direction in relation to soybean and sugarcane production, as there is a significant decline in their cultivated area. In 2002, rice occupied an area of 3.2 million hectares, while in 2015/16 it occupied around 2 million hectares, which indicates a decrease of 37.5% in 13 years. In 2002, beans occupied an area of 4.3 million hectares and only 3.0 million hectares in 2015/16 – representing a reduction of 31% in the cultivated area. In the case of cassava, the decline in the planted area reached 23% in 11 years; wheat, in turn, had its planted area reduced in 22% within 13 years.

Due to increasing levels of productivity, especially for rice, beans and wheat, the pace of

decline in their production did not match the pace of the decrease in the respective planted area. As for rice, an appreciable increase in the production occurred during 2015/16 as compared to 2002, which was around 6%; however, its production declined in 17% as compared to 2008/9. Regarding beans, comparing the production of 2015/16 to that of 2002/3, we find a decrease of 1%, which is almost stagnation. In addition, if we compare its current production to that of 2008/9, we find a decrease of 9%. The production of wheat was reduced in 5% in 13 years, and that of cassava 14% in 11 years.

It should be added that according to *Projeções do Agronegócio – Brazil 2014/15 – 2024/25*[16] (Projections on Agribusiness), published by the Brazilian Ministry of Agriculture, Livestock and Food Supply (MAPA), Brazil has of late imported these basic national foods (except cassava). In 2015, Brazil imported 850 thousand tons of rice, 150 thousand tons of beans, and six million tons of wheat. According to projections from MAPA, the forecast is that Brazil will keep importing these foods in the ten coming years.

Currently, if we summed up the cultivated areas of rice, beans, wheat and cassava, we would come to a number close to 8.5 million hectares, which equates to a smaller area than that occupied by sugarcane cultivation. Furthermore, if we summed up the areas of these four crops including sugarcane, it would result in roughly 17 million hectares, which is half the soybean planted area. Therefore, it is remarkable that Brazilian agriculture, seen from the perspective of its globalization, has consolidated itself through the expansion of cultivations oriented to be transformed into commodities or agrofuels which demand an intensive use of agrotoxins, as we will approach later on.

There is a clear, even though not necessarily direct (in loco), relationship between the expansion of commodities or cultivations oriented to agroenergy and the decline in food production, as Porto-Gonçalves and Alentejano (2010) as well as Oliveira (2012a; 2012b) demonstrated. It means that, in the perspective of enlarged reproduction of capital, a good is solely a good – and this goes far beyond an apparent redundancy – in which food is demeaned, and its use value is not important any longer.

With the transformation of food into commodity and agroenergy, there emerges a new ingredient: the dimension in which such food can be consumed. The transformation of food into these two "products" enables its consumption (for, in the perspective of capitalist agriculture, food has always been solely a good) to occur exponentially.

In the context of "green" or "renewable" fuel, the possibilities of exporting Brazilian ethanol enhance, but they also reproduce and "renew" old forms of oppression and labor exploitation, as Garvey, Tyfield and Mello (2015) highlight:

> *Agrofuels are increasingly sourced and sold as a socially and environmentally beneficial solution to oil dependence. The promotion of sugar-derived ethanol as a substitute for petroleum has thus been key to state development and international trade*

16 Available at: http://www.agricultura.gov.br/arq_editor/PROJECOES_DO_AGRONEGOCIO_2025_WEB.pdf

policies by Brazil and the European Union, respectively, and subsequent investment by leading energy and food transnational corporations has transformed socio-spatial relations in the new sites of production. Brazilian rural worker testimonies, however, point to large-scale labour exclusion rather than reform and a deepening, rather than disruption, of historic power inequalities in the sector. Labour contestation challenges a converging institutional discourse of responsible technological innovation and social upgrading associated with emerging commodity chains and the 'green' economy. Although corporate and statutory response has been market-orientated certification and 'more technology' the idea of the 'technoinstitutional fix' provides a power relation-attentive analysis that invites the further exploration of socially committed alternatives to food and energy production.

Thus, it is worth taking into account the logic of this modern agriculture, which brings along the loss of labor rights, the expulsion of peasants from their lands, environmental contamination and, at the same time, high rates of poisoning of farm workers and peasants by continued use of agrotoxins, in addition to the suppression of areas destined to food production, as discussed earlier. This perspective enables the understanding of the dimension of soybean culture in Brazil, although this is not an isolated event. It is no accident that we may see the same process occurring in Argentina, with similar social and environmental injuries[17].

Galeano (2010) brought the following question in his preface to the Brazilian edition of *Latin America's Open Veins*: "Do we export products, or soils and subsoils?". We may add to this quote that in Brazil, we export "water and sun", which combined "shorten" plant growth time and allow them to reproduce in abundance, since the higher the levels of heat and humidity the higher the biomass production (Grigoriev, 1968).

However, beyond the impact of the production of agricultural and agroenergy commodities, either on water availability[18] or food production in the country, another consequence should be considered. The advance of capitalist agriculture is followed by a resurgence of Brazilian land concentration.

Table 1

Evolution of Land Ownership in Brazil (2003 – 2014)

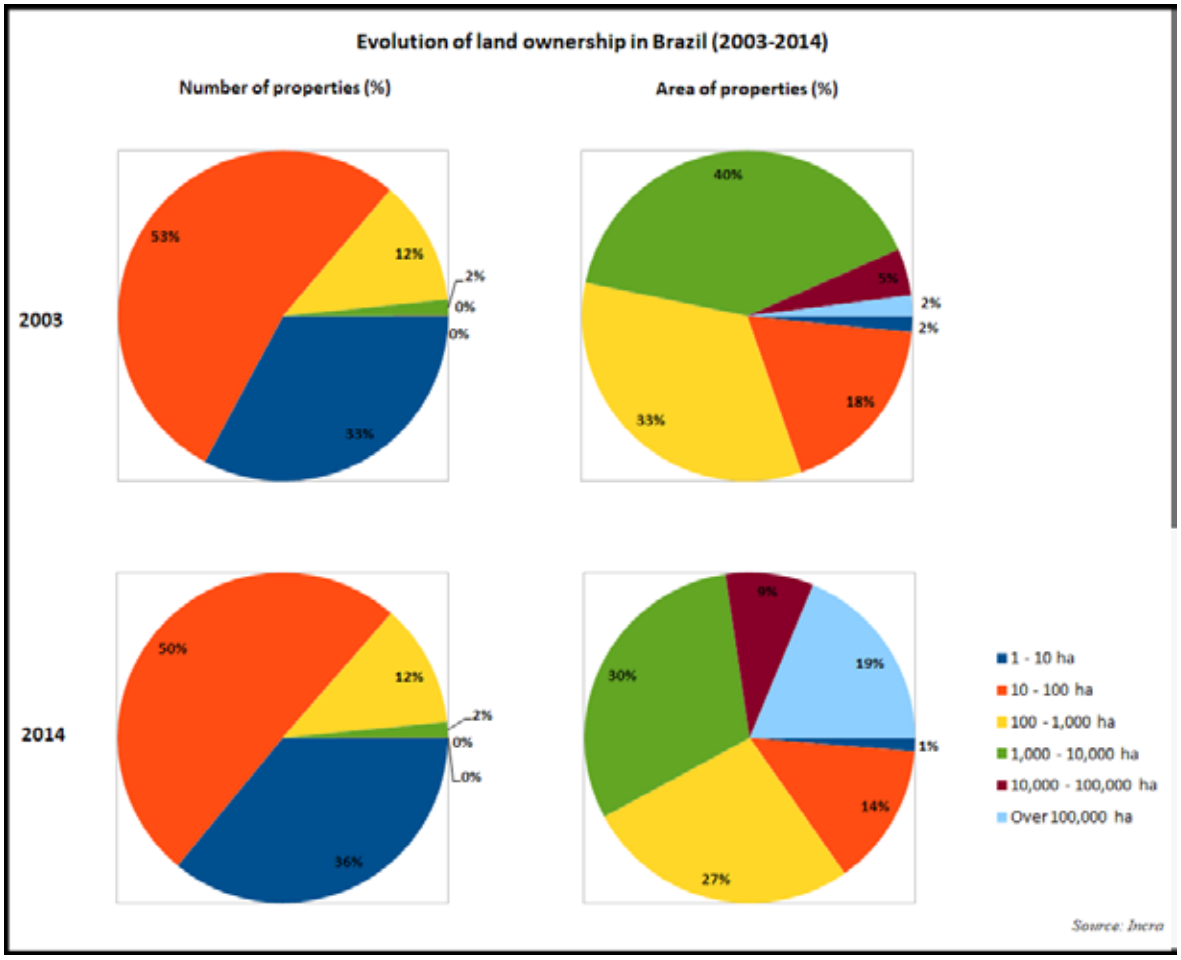
Real Estate size	Rural properties							
	2003				2014			
	Number	(%)	Area	(%)	Number	(%)	Area	(%)
1 - 10 ha	1,409,797	33	6,638,597	2	2,208,467	36	9,713,044	1
10 - 100 ha	2,289,014	53	75,782,409	18	3,097,263	50	103,277,382	14
100 - 1.000 ha	523,335	12	140,362,234	34	739,358	12	198,722,832	27
1.000 - 10.000 ha	67,402	2	168,101,028	40	91,973	1	226,207,605	31
10.000 - 100.000 ha	961	0,02	19,284,741	5	2,692	0,04	63,839,244	9
Over 100.000 ha	22	0,001	8,314,316	2	365	0,006	138,641,532	19
Total Brazil	**4,290,531**	**100**	**418,483,325**	**100**	**6,140,118**	**100**	**740,401,639**	**100**

Source: Incra

17 On this subject see, Argentinian artist Pablo Piovano's virtual photographic exhibition entitled "The Human Cost: El Chino Portraits": http://www.pablopiovano.com/human-cost/the-human-cost.html

18 NEGRÃO, S. L. 2008.

Chart 9



Just to illustrate the degree of land concentration, according to INCRA (Brazilian Institute for Colonization and Agrarian Reform), in 2003, there were in Brazil 961 properties with areas ranging from 10,000 to 100,000 hectares, which corresponded to 0.02% of the total properties, and to 5% of the total area occupied by them in the country. However, in 2014, the total of properties with the same area range (from 10,000 to 100,000 hectares) was 2,692 (0.044% of the total), which corresponded to 9% of the total area.

By analyzing data from properties greater than 100,000 hectares, we notice that the evidence of land concentration is even more evident. In 2003, the number of such properties was 22 and corresponded to 0.001% of the total of rural properties, occupying 2% of the total area. However, in 2015, the number rose to 365, corresponding to 0.006% of the total, and their occupied area represented 18% of the rural properties' total area.

Therefore, it means that 0.006% of rural properties in Brazil represent practically 1/5 of the whole area occupied by rural properties. The magnitude of the increase in Brazil's land concentration may also be measured by the percentage of land occupation of all the properties over 1,000 hectares. In 2003 it was 47% of the total area, which indicates a high land concentration, since these properties corresponded to only 2.021% of the total rural properties.

Nevertheless, this scenario presented an even higher level of land concentration in 2015. During this year, the properties over 1,000 hectares corresponded to 1.05% of the total rural properties, and to 57% of the total area of rural properties, which means that about 1% of the properties occupied roughly 2/3 of the whole area. It is worth mentioning that a significant part of the large rural properties is illegally settled[19]. According to Professor Ariovaldo Umbelino de Oliveira, interviewed by *Caros Amigos* (Dear Friends) Magazine (n 227/2016)[20]:

> The town of São Felix do Xingu, in Amazonia, has the second largest cattle herd in Brazil; however, it does not have a single land title registered... 94% of the farms in (the states of) Pará and Amazonas are in fact public areas, that is, they are illegally settled lands, with no ownership titles. Large land owners often say that Brazil has no land security. The real issue is not lack of security, but the fact that the greatest part of farms in the country has been appropriated illegally.

Add to that the fact that the greatest contingent of workers submitted to labor conditions analogous to slavery in Brazil over the past ten years were found in agriculture: 74.7% of the total, as indicated in the map "Brazil – Labor Analogous to Slavery", included in this Atlas. By verifying the municipalities where labor analogous to slavery occurred in agriculture, we can see a concentration in the east and southeast of Pará (area concentrating great part of the conflicts in the country[21]), west of Bahia, and south of Minas Gerais.

Therefore, we must keep pulling "Ariadne's thread" by considering what both the production and exports of commodities and agroenergy – the capitalist agriculture – encompass: higher land concentration, lower food production, degrading working conditions[22], along with impacts on the environment and water[23]. Adding all this to the "myth", created in economic terms, of the importance of this sector in Brazilian economy[24], there still remains a point to discuss: the globalization mechanism of this agriculture at the other end– production with intensive use of agrotoxins.

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19 About illegal occupation of public land in Brazil, see Sandra Helena Gonçalves Costa's PhD dissertation, in which she conducted a thorough investigation on the theme in the north of the state of Minas Gerais (Costa, 2017). Available at: http://www.teses.usp.br/teses/disponiveis/8/8136/tde-08012013-143125/pt-br.php

20 Available at: https://www.carosamigos.com.br/index.php/colunistas/180-outras-noticias/artigos-e-debates/6017-o-brasil-roubado-por-latifundiarios

21 "Over the past 32 years 45 massacres took place in the field and over 200 deaths occurred throughout Brazil. Pará alone accounts for 26 massacres involving 125 people murdered". Available at:: https://g1.globo.com/pa/para/noticia/o-para-e-o-estado-com-o-maior-numero-de-massacres-no-campo-s7egundo-a-cpt.ghtml. See especially the data collected by the Comissão Pastoral da Terra (CPT – Pastoral Land Commission): Available at: https://www.cptnacional.org.br/publicacoes-2/destaque

22 GARVEY, B.; BARRETO, M. J. 2014; and GARVEY, B. TYFIELD, D.; MELLO, L. 2015

23 There are also other environmental impacts not discussed in this text. On this subject, see: Negrão (2008), among others.

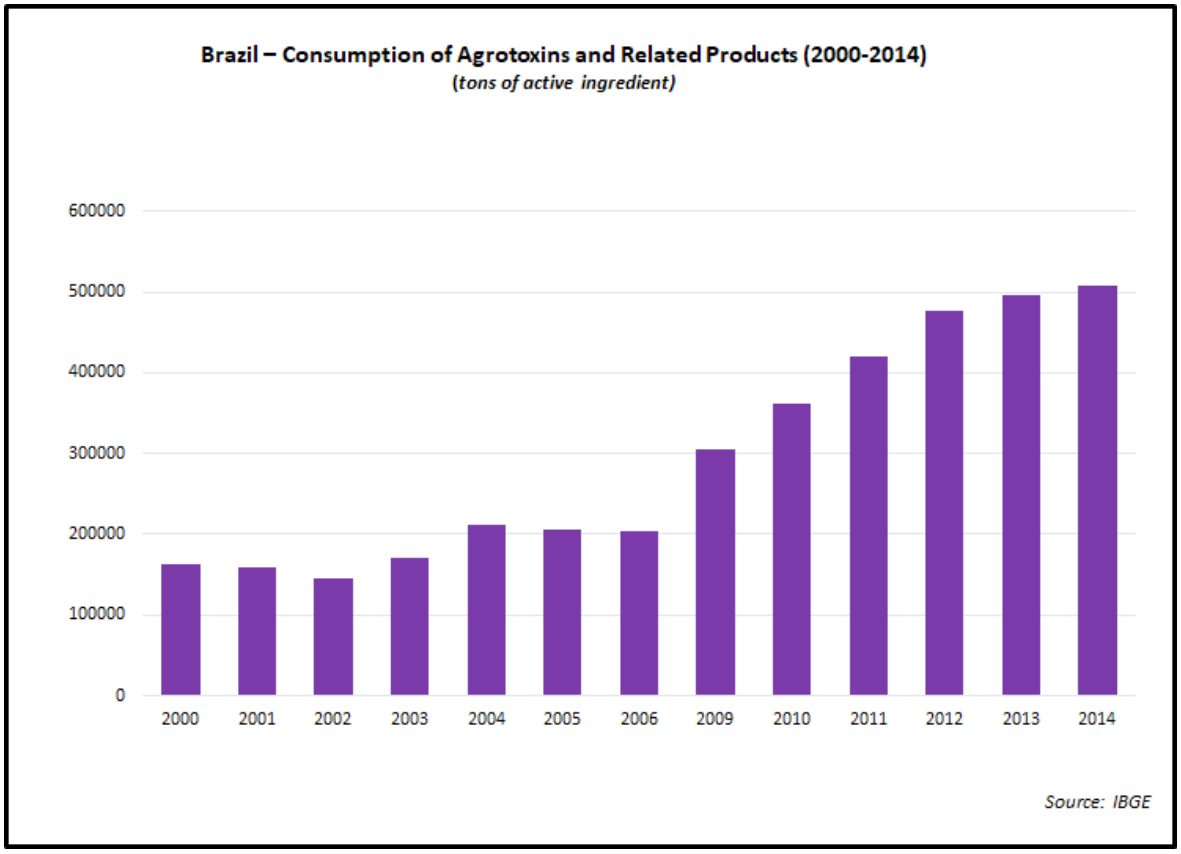
24 See Oliveira, 2015.

III. THE MINOTAUR: THE USE OF AGROTOXINS IN BRAZIL

The Minotaur symbol is used here to "illustrate" the effects of capitalist agriculture in Brazil. Its image, as an allegory to discuss the use of agrotoxins in Brazil and its connections to the European Union will be gradually clarified throughout this section. The advance of cultivations and farming production oriented to conversion of crops into commodities and agroenergy has been carried out through a massive use of agrotoxins.

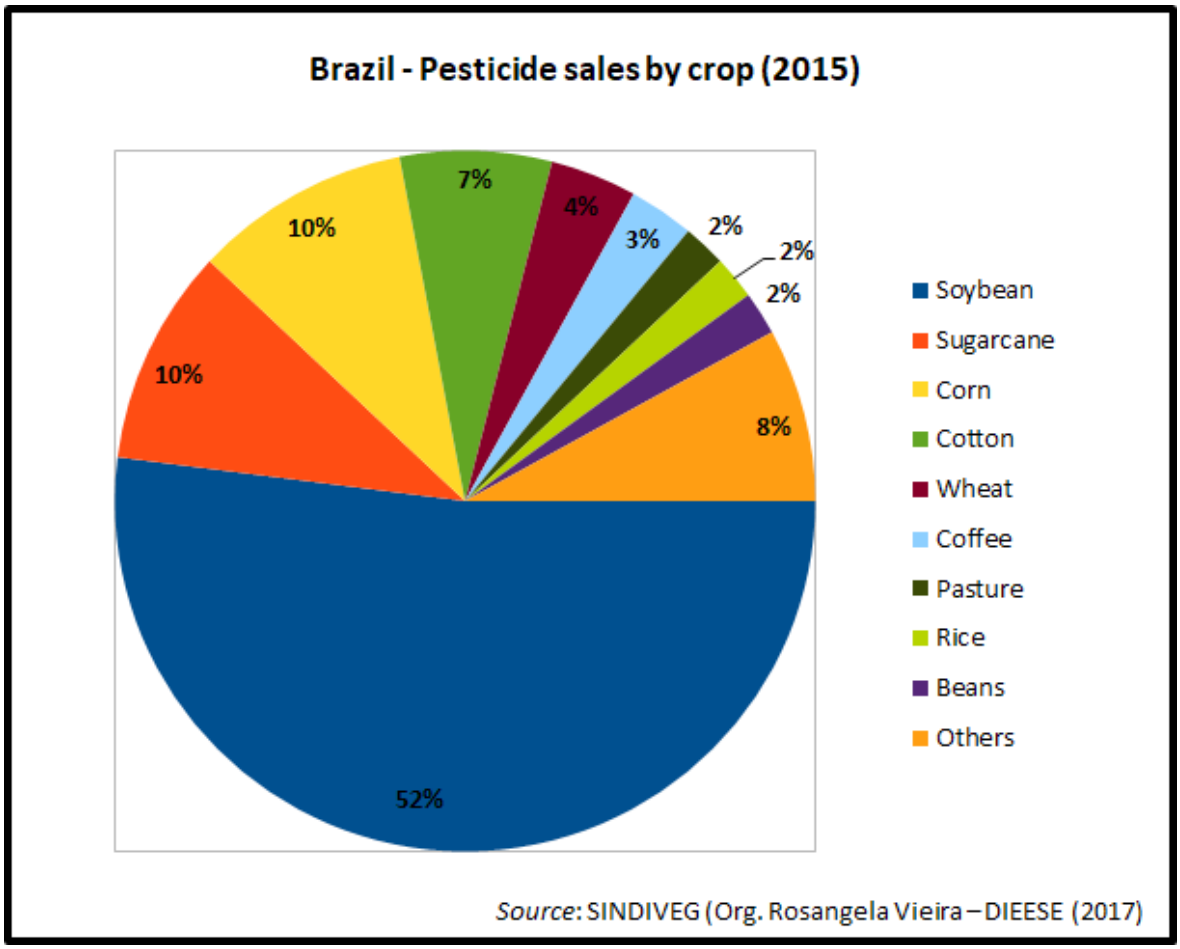
Brazil consumes around 20% of all agrotoxins commercialized worldwide (PELAEZ et al, 2015); a consumption, it should be observed, that has increased very significantly over the past few years. As illustrated in Chart 10, the total consumption of agrotoxins in Brazil boosted from about 170,000 tons in 2000 to 500,000 tons in 2014, that is, an increase of almost 300% over a period of only 15 years.

Chart 10



As shown in Chart 11 below, according to the SINDIVEG (National Union of the Industry of Products for Plant Protection) in 2015, soybean occupied the first place in the total of agrotoxin sales in the country (52%); corn and sugarcane tied, each consuming 10% of the total.

Chart 11



Noteworthy is the fact that soybean, which currently occupies over 30 million hectares of the Brazilian soil be the sole destination of more than half of the volume of the agrotoxins commercialized in the country. And to soybean, corn and sugarcane – the three main cultivations – converge 72% of all agrotoxins commercialized in Brazil. This means that more than two thirds of all agrotoxins are destined to these three main cultivations of the Brazilian capitalist agriculture. In addition, these cultivations are ranked within the top 12 of total exports.

The consumption of agrotoxins has increased all over the world. According to Pelaez, V. (2011) such a boost corresponded to 100% between 2000 and 2010. In Brazil however, the rise corresponded to practically 200%, a pattern repeated until 2014, as is shown in Chart 10.

According to Pelaez, V. et al, 2015:

> From the 2000's on, Brazil has presented the highest growth rate of world imports of agrotoxins, becoming the second major national market, with sales up to US$ 11.5 billion in 2013 (SINDIVEG, 2014) and also the largest importer in the world, presenting a value of US$ 3 billion that same year (COMTRADE, 2014). (PELAEZ, V. et, al 2015, p. 155).

As illustrated in the Map "BRAZIL – Agrotoxin Use – Quantity Used", from 2012 to 2014

we had an average use of agrotoxins in Brazil of 8.33 kg per hectare. It is clear that even though Brazil's average is 8.33 kg per hectare, regional differences do exist. For example, in the states of Mato Grosso, Mato Grosso do Sul, Goiás and São Paulo, this number figures between 12 and 16 kg per hectare.

Over the past few years, we have seen a great expansion of transgenic cultivations. Currently, in Brazil, 96.5% of the production of soybean is transgenic, corresponding to an area of 32.7 million transgenic planted hectares; 88.4% of the production of corn is transgenic, which corresponds to 15.7 million hectares; 78.4% of the production of cotton is also from transgenic seeds, corresponding to 789 thousand hectares cultivated this way.[25] A significant part of these transgenic crops comes from seeds tolerant to the herbicide glyphosate, the main agrotoxin commercialized in Brazil.

Table 2 presents the active ingredient Glyphosate as not only the best-selling agrotoxin; also, by summing up the sales of active ingredients occupying the second to tenth place in sales, the respective result is below the volume of Glyphosate.

Table 2

Brazil – Top ten sales of active ingredients (2014)

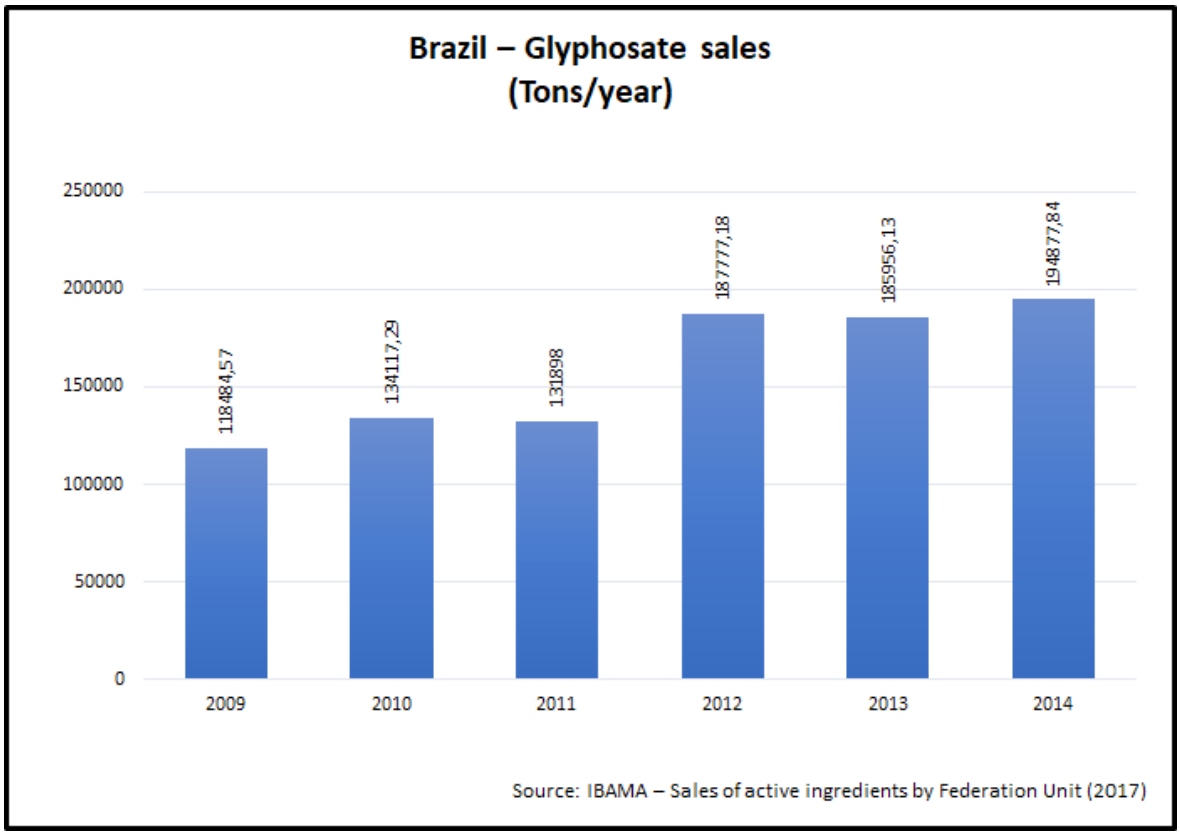
Active ingredient (AI)	Sales (ton of AI)	Ranking
Glyphosate and its salts	194.877,84	1º
2,4-D	36.513,55	2º
Acephate	26.190,52	3º
Mineral Oil	25.632,86	4º
Chlorpyrifos	16.452,77	5º
Vegetal Oil	16.126,71	6º
Atrazin	13.911,37	7º
Mancozeb	12.273,86	8º
Methomyl	9.801,11	9º
Diuron	8.579,52	10º

Source: Consolidation of data provided by companies registering technical products, pesticides and related products as requested by article 41 of Decree 4.004/2002 (updated: 04/06/2016)

Thus, the volume of Glyphosate sold in Brazil corresponds to more than half of the total volume of commercialized agrotoxins. We highlight that over the past few years the consumption of Glyphosate in Brazil has increased significantly, as indicated in Chart 12.

25 Source: celeres. Available at:: https://www.brasildefato.com.br/2016/09/01/transgenicos-ja-chegam-a-93-da-area-plantada-com-soybean-milho-e-algodao/

Chart 12



We notice that between 2009 and 2014, the sales of Glyphosate in Brazil grew from 118 thousand tons to 194 thousand tons, an increase of 64% just in six years. In terms of use distribution of Glyphosate in Brazil, as we can see in the Map "BRAZIL – Glyphosate Sales", we have the following scenario: around 38 thousand tons of Glyphosate were sold in 2014 to the state of Mato Grosso, which leads the consumption, followed by the states of Paraná and Rio Grande do Sul, to which around 25 thousand tons of glyphosate were sold.

In a report published by the World Health Organization in 2015 entitled "*IARC*[26] *Monographs Volume 112: Evaluation of Five Organophosphate Insecticides and Herbicides*", the organization admits that the active ingredient glyphosate may cause cancer in animals treated in laboratory. In addition, the report indicates that Glyphosate is a potential causative agent of alterations in DNA and chromosome structures in human cells[27].

26 IARC = International Agency for Research on Cancer.

27 In the terms of the original document:

For the herbicide glyphosate, there was limited evidence of carcinogenicity in humans for non-Hodgkin lymphoma. The evidence in humans is from studies of exposures, mostly agricultural, in the USA, Canada, and Sweden published since 2001. In addition, there is convincing evidence that glyphosate also can cause cancer in laboratory animals. On the basis of tumours in mice, the United States Environmental Protection Agency (US EPA) originally classified glyphosate as possibly carcinogenic to humans (Group C) in 1985. After a re-evaluation of that mouse study, the US EPA changed its classification to evidence of non-carcinogenicity in humans (Group E) in 1991. The US EPA Scientific Advisory Panel noted that the re-evaluated glyphosate results were still signifi-

Brazilian researchers Sonia Hess and Rubens Onofre Nodari, after a large international scientific literature review on the active ingredient "Glyphosate", emitted a technical opinion, issued on 23/05/2015 and addressed to the Brazilian Public Federal Ministry, in which the authors pointed out the following conclusions:

> Authors described, in 2009, that glyphosate has an endocrine disruptive effect on human liver cells (GASNIER et al., 2009); a study published in 2012 reported that Roundup, at parts per million (ppm) concentrations, induced necrosis and programmed death in cells (apoptosis) of rat testicles, among other effects indicating hormone interference in those mammals (CLAIR et al., 2012). White male rabbits treated with solutions of glyphosate presented: decreased body weight, reduction of libido, of volume of ejaculations, of sperm concentration; and increased amount of abnormal or dead sperms (YOUSEF et al, 1995).
>
> A study published in 2013 revealed that glyphosate, at parts per trillion (ppt) concentrations induces the proliferation of human breast cancer cells (THONGPRAKAISANG et al., 2013).
>
> Séralini and collaborators (2014) published the results of a long-term study involving rats throughout their lifetime. The animals treated with water containing the herbicide Roundup (0.1 parts per billion) or with Roundup-tolerant transgenic corn, presented around 70 significant statistic differences related to the following parameters: hematological (hematocrit, platelets, neutrophils, lymphocytes, monocytes, mean corpuscular volume, mean hemoglobin corpuscular concentration), clinical chemicals (albumin, blood urea nitrogen, creatinine, phosphorus, sodium, chloride, alkaline phosphatase, calcium, potassium), urinary chemicals (creatinine, phosphorus, potassium, clearance of creatinine, pH, calcium), organ weights (heart, brain, liver), body weight and weight alteration, and food consumption of the animals. Resulting from these alterations, there was an increase in the risk of developing: breast cancer in females, cancer and damages to the gastrointestinal system, kidneys and liver, especially for males, in addition to shorter life span for both sexes (...)[28]

However, Law 7802 of July 11, 1989[29], known as the Law of Agrotoxins, established that:

> When international organizations responsible for health, food or the environment, which Brazil integrates or is a signatory member of treaties and agreements, warn about the risks or advise against the use of agrotoxins, their components and related matters, it will be up to the competent authority to take

cant using two statistical tests recommended in the IARC Preamble. The IARC Working Group that conducted the evaluation considered the significant findings from the US EPA report and several more recent positive results in concluding that there is sufficient evidence of carcinogenicity in experimental animals. Glyphosate also caused DNA and chromosomal damage in human cells, although it gave negative results in tests using bacteria. One study in community residents reported increases in blood markers of chromosomal damage (micronuclei) after glyphosate formulations were sprayed nearby.

Available at: https://pedlowski.files.wordpress.com/2015/03/monographvolume112.pdf

28 Available at: http://noticias.ufsc.br/files/2015/07/parecer-t%C3%A9cnico-N.-01.pdf

29 Available at: http://www.planalto.gov.br/ccivil_03/leis/L7802.htm

> immediate actions, on pain of liability.
>
> § 6th The registry of agrotoxins, components and related matters shall be prohibited:
>
> a) for which Brazil does not have methods for deactivating components in order to prevent their remaining residues from causing risks to the environment and public health;
>
> b) for which antidote or efficient treatment are inexistent in Brazil;
>
> c) which reveal teratogenic, carcinogenic or mutagenic characteristics according to updated results from experiences of the scientific community;
>
> d) which cause hormone disorders, damages to the reproductive system according to updated procedures and experiences of the scientific communities;
>
> e) which prove to be more dangerous to men than the laboratory tests involving animals were able to demonstrate, according to updated technical and scientific criteria;
>
> f) whose characteristics cause damages to the environment.

Notwithstanding the content of the law, the active ingredient Glyphosate has been undergoing an evaluation process by ANVISA since 2008 in Brazil[30]; on the other hand due to evidence of carcinogenicity and other harmful effects to human health, it will be banned in France as of 2022[31]. Agrochemical manufacturing companies, multinationals oligopolistically organized[32], maintain their production and/or commercialization of active ingredients according to the *permissiveness* of the legislation and/or application of the legislation in each country. According to Pelaez *et al*:

> ... (The) European Union implemented in 2011 a more restrictive regulatory mark for agrotoxins, causing a series of active ingredients to be undergoing a banning phase in the region of the economic block.

This holds implications to the industry of agrotoxins installed in Brazil since multinational companies tend to relocate part of their production to less restrictive markets... (PELAEZ, V. et al. 2015, p. 156)

Brazil is one of the countries that could be characterized as belonging to the group of the "less restrictive markets", using here a cautious expression to replace the term *permissive*. In this context, as stated by Porto-Gonçalves (2006, p. 267):

> We also highlight that the companies of the agrochemical sector have almost all of their head offices in European countries, USA and Canada. Therefore, we

30 In September 2016, the European Parliament "voted on a resolution requesting to shorten the deadline for commercial renewal of glyphosate from 15 to 7 years. The congressmen claimed to be worried with the impact on human health of the herbicide, which is largely used both in rural properties and gardening. The resolution obtained 374 votes in favor, 225 against, and 102 abstentions." Available at: http://www.valor.com.br/agro/4522983/ue-estuda-encurtar-prazo-para-renovacao-comercial-do-glifosato

31 Available at: http://gazeta-rs.com.br/franca-bane-uso-de-glifosato/

32 Pelaez, 2011; Bombardi, 2011.

> witness an uneven geography regarding the use of these supplies throughout the world, revealing the unequal way in which places, regions, countries and their peoples and cultures are valued. We insist that it reproduces the same modern-colonial logic that has been controlling the process of globalization since 1492. As we can see, there is an underlying environmental injustice controlling the world geopolitics.

A critical piece of information in this regard is that in Brazil there are 504 Active Ingredients with authorized registration, that is, they can be freely used; however, out of these, 149 are prohibited in the European Union. It means that 30% of all Active Ingredients (agrotoxins) used in Brazil are prohibited in the European Union[33]. We also emphasize that among the ten best-selling Active Ingredients in Brazil, two are prohibited in the European Union.

Example of such permissiveness is the Active Ingredient Acephate which, according to Table 2, occupies the third place in the list of the best-selling active ingredients in Brazil. This Active Ingredient, Acephate, underwent a process of evaluation by the Health Ministry of Brazil through ANVISA (Brazilian National Health Surveillance Agency), that issued a technical note after evaluating this active ingredient. According to this technical note[34]:

> (...) Another severe neurological condition triggered by exposition to OPs [organophosphates, such as acephate] was identified more recently and is now known as "intermediate syndrome".
>
> The intermediate syndrome (IMS) is characterized by a pronounced weakness of the respiratory muscles and a decrease in the strength of muscles of the neck and proximal limb muscles.
>
> These symptoms appear few hours after the beginning of the cholinergic hyperstimulation (acute poisoning). The IMS causes respiratory impairment and, in the absence of prompt service in hospitals equipped with assisted respiration apparatus, may cause death (...)
>
> Another serious concern is the fact that experimental studies have suggested that children (organisms still in development) may be more vulnerable to the effects of OPs. There is also clear evidence indicating that a continued exposition of animals in development phase to low doses of OPs may adversely affect growth and maturation. (...)
>
> Due to its pronounced neurotoxicity and suspicions of carcinogenicity, acephate has been restricted in many countries. In March of 2003, the European Union established the non-inclusion of acephate in Annex I of Directive 91/414/CEE, which deals with substances that can be used to control plagues in agriculture.

However, even after this evaluation pointing out to "pronounced neurotoxicity" in the active ingredient mentioned and "suspicions of carcinogenicity", which contradicts the Law of

33 Agrofit (2017); Anvisa (2017); Gonçalves, 2016.

34 Available at: http://portal.anvisa.gov.br/documents/111215/117758/Nota%2Bt%25C3%25A9cnica%2Bdo%2Bacephate.pdf/dea442bb-8270-4fc7-9234-01334f26c00e?version=1.0

Agrotoxins, as observed in the above excerpt, the active ingredient "Acephate", which was prohibited in the European Union ten years before its reevaluation in Brazil, had its use renewed:

> Result of the Process of Reevaluation of the Active Ingredient ACEPHATE:
> [...]
> Art. 5 - It is maintained in the compendium of the active ingredient acephate the authorization to be used in cultivations of peanuts, cotton, potato, broccoli, citrus, cabbage, cauliflower, beans, melon, kale, soybean, and tomato for industrial uses, exclusively for mechanized equipment application.
> Brazil: *DIÁRIO OFICIAL DA UNIÃO* (BRAZILIAN FEDERAL REGISTER) – 04/10/2013[35]

It can be noted that the only alteration in the Result of the Reevaluation published in the Brazilian Federal Register regards the form of application of the active ingredient acephate. However, despite all the evidences and contrary the law, its authorization was maintained. In any case, the Legislation continues to be an obstacle to the use of agrotoxins, at least hypothetically mediating human and environmental protection.

In this context, for the analysis proposed in this work, it is essential to draw a parallel between the Brazilian and the European Union legislations about agrotoxins, as well as the developments regarding their upstream and downstream use. While in Brazil a agrotoxin is registered and used for an indefinite period of time, and its reevaluation occurs only in extreme cases (carcinogenic, mutagenic and teratogenic effects), what we observe in the European Union is a very different principle.

The equivalent, in legal terms, to the Brazilian Law of Agrotoxins in the European Union is called Directive 91/414/EEC of July 15 1991, regarding the "Commercialization of Phytosanitary Products"[36]. In its inicial considerations, the Directive 91/414/EEC establishes that "…substances on the Community list should be reviewed periodically, to take account of developments in science and technology and of impact studies based on the actual use of plant protection products containing the said substances;" (our emphasis)*;*

According to Article 4 of Directive 91/414/EEC, an active ingredient is not authorized, unless:

> [...]
> (i) it is sufficiently effective;
> (ii) it has no unacceptable effect on plants or plant products;
> (iii) it does not cause unnecessary suffering and pain to vertebrates to be controlled;
> (iv) it has no harmful effect on human or animal health, directly or indirectly (e.g. through drinking water, food or feed) or on groundwater;

35 Available at: http://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.jsp?jornal=1&pagina=115&data=04/10/2013

36 Available at: http://eur-lex.europa.eu/legal-content/PT/TXT/?uri=CELEX%3A31991L0414

Two elements of Article 4 of Directive 91/414/EEC, both under item iv, must be highlighted: the first establishes that active ingredients that cause harmful effects to human health "directly or indirectly" must not be authorized. The second establishes that active ingredients cause the same risks (even indirectly) to drinking or underground water must not be authorized.

What we observe in Brazil at present is a tendency opposite to the "principle of precaution", implicit in the Directive 91/414/EEC and its subsequent legislation. So much it is true that, as stated earlier, 30% of the active ingredients used in Brazil are prohibited in the European Union, which includes two of the ten best-selling ones in Brazil.

According to Victor Pelaez (et al 2015):

> The logic of expansion of these companies [multinational manufacturers of agrotoxins] tends to concentrate activities with stronger investment intensity in their countries of origin (...) Conversely, the location of industrial units in less developed countries follows the strategy of externalization of agrotoxin production at the end of the life-cycle, along with increasingly restrictive legislations in the countries of origin (SILVEIRA; FUTINO, 1990; SILVEIRA, 1993; NAIDIN, 1985). (PELAEZ et al, 2015, p. 160, our emphasis).

The strategy of agrochemical companies is undoubtedly linked to different perspectives of action according to the legislations of each country:

> (...) In addition, the productive units manufacture products with specific formulations according to the agricultural activity of each country, due to national regulatory marks. For instance, certain active ingredients can be prohibited in some countries, but authorized in others. Following these regulatory restrictions, companies install production units of certain active ingredients (AI) in countries where they remain authorized. This is the case of the Danish company Cheminova, whose production unit in India manufactures acephate-based agrotoxins, an AI prohibited in the European Union (EU) (CHEMINOVA, 2014). Another example is the Swiss company Syngenta, whose unity in the USA manufactures atrazine-based agrotoxins, an AI also prohibited in the EU (SYNGENTA, 2014). (PELAEZ et al, 2015, p. 165, our emphasis)[37].

Agrotoxin manufacturing companies seek environmental concessions in peripheral countries or, using the terms of the aforementioned authors, follow the strategy of "*externalization of agrotoxin production at the end of the life-cycle, along with increasingly more restrictive legislations in the countries of origin*". In addition to the massive quantity of agrotoxins used in Brazil – around 1/5 of all agrotoxin commercialized in the world (Pelaez, 2015) – as revealed by this research, there is also the "quality" attribute of such use.

The "quality" involved in the use of agrotoxins in Brazil refers both to the diversity of types of agrotoxins and the way they are used; for example, through aerial spraying, which is allowed

37 We highlight that both active ingredients mentioned by the author – acephate and atrazine – are authorized in Brazil.

in Brazil, but prohibited in the EU, as will be discussed later. In other terms: what is not allowed in the countries of origin is allowed in many other countries of the South. Therefore, there is "an uneven geography of gains and losses", using an expression of Porto-Gonçalves (2006). Table 3 exhibits the sales of agrotoxins by the ten major producers.

Table 3

World Agrotoxin Market – Ten major companies (2016)			
	Company	Agrotoxin sales (U$ Billons)	Market share (%)
1ª	Syngenta (Swiss) *[China*]*	9,571	19,2
2ª	Bayer CropScience (Germany)	8,810	17,6
3ª	BASF (Germany)	6,163	12,3
4ª	Dow AgroSciences (USA)	4,631	9,3
5ª	Monsanto (USA)	3,514	7,0
6ª	DuPont (USA)	2,884	5,8
7ª	Adama (China)	2,877	5,8
8ª	Sumitomo Chemical (Japan)	2,380	4,8
9ª	FMC (USA)	2,270	4,5
10ª	UPL (USA)	2,157	4,3
	Others	4,663	9,3
	Total	49,920	100
	Source: AgroNews (http://news.agropages.com/News/NewsDetail---24183.htm)		

In can be noticed by the data presented in Table 3 that, up to 2016, about 50% of the agrotoxin market has been controlled by companies whose head offices are located in the European Union, notably in Germany and Switzerland. According to what Mark Reichardt, Global Operations Director of Bayer (German company which controls practically 1/5 of the agrotoxin market), said in an interview to *Dinheiro Rural* (Rural Money) Magazine (2016)[38], Brazil is the main market of Bayer. The world market of agrotoxins is getting more concentrated year after year, and is controlled by North American, German and Swiss capital.

We also emphasize that even though negotiations have not been finished yet, the purchase of Monsanto by Bayer[39] is in progress; Dow and Dupont are merging, and Syngenta was bought by ChemChina, a Chinese state company[40]. China controls roughly 25% of the world market of agrotoxins after the acquisition of Syngenta and Adama in 2014. These negotiations confirm an unequivocal tendency of extreme concentration. In addition, they point out China as the

38 Available at: http://www.dinheirorural.com.br/secao/melhores-da-dinheiro-rural/uma-fazenda-para-o-futuro

39 Available at: http://revistagloborural.globo.com/Noticias/Empresas-e-Negocios/noticia/2017/09/bayer-deve-concluir-compra-da-monsanto-em-janeiro.html

40 Available at: https://g1.globo.com/economia/negocios/noticia/chemchina-completa-a-compra-da-syngenta-por-us-43-bilhoes.ghtml

potential greatest controller of this market, since other companies occupying between the 11th and 20th position in the global ranking of agrotoxin producers are also Chinese.

In parallel to the agrotoxin sector concentration of capitals, while profits are rising (DIEESE, 2015), the environmental legislation in the EU in general, and specifically regarding agrotoxins, has become increasingly more restrictive, with a view at intensifying such restrictions and standardizing both the use and the inspection of agrotoxins.

What there is in fact is an International Socioenvironmental Divison of Labor, or better said, an International Geographical Division of Labor. The maps included in this Atlas enable us to look specifically into this uneven Geography of the Use and Impacts of Agrotoxins. We point out some examples.

According the Map "BRAZIL – Acephate Sales" – an active ingredient prohibited in the EU that is number three in the Brazilian ranking of sales – the state of Mato Grosso is the sales leader and the amount sold to this state is almost equivalent to the sum of sales to the remaining states of Brazil.

Another active ingredient worth being analyzed in the list of the ten best-selling agrotoxins in Brazil is Atrazine. It is an insecticide occupying the 7th place in the Brazilian list of best-selling agrotoxins, according to the Map "BRAZIL – Atrazine Sales". It is prohibited in the EU since 2004, having remained authorized in Brazil for the cultivations of pineapple, sugarcane, corn, millet, pine, rubber tree, sisal, and sorghum. In absolute terms, the state of Mato Grosso do Sul is the lead user of Atrazine, followed by São Paulo and Mato Grosso.

The permission to use Atrazine in sugarcane certainly explains why São Paulo and Mato Grosso do Sul are the largest consumers of Atrazine, while, in overall terms (the total use of agrotoxins, regardless of their type) Mato Grosso is the lead user, surpassing even the amount used by the states of São Paulo and Mato Grosso do Sul together, as illustrated in the Map "BRAZIL – Agrotoxins Use – Quantity Used".

IV. THE THREE FACES OF THE MINOTAUR: ASYMMETRIES BRAZIL – EUROPEAN UNION

There are three important aspects (faces) to clarify the dialectics of this uneven geography regarding the use and impacts of agrotoxins. The asymmetries between the use of agrotoxins in Brazil and in the European Union involve: "what is used"; "how much is used"; and "how it is used".

1. The first face: what is used. It regards what we have been discussing about the difference between which active ingredients are allowed in Brazil and in the EU. Consequently, it refers to "what is used here", in Brazil, in the "South" and, nonetheless, is prohibited there, in the European Union, in the "North".

In this context, the maps in section "Brazil – Exports to the European Union" which show

data about agrotoxins prohibited in the EU" and allowed in Brazil – are appropriated to demonstrate the absolute asymmetry between the use of agrotoxins in Brazil and in the EU. Among these maps, we highlight the most iconic cases in terms of the Brazilian exports to the EU, namely coffee, citrus and soybean. In 2016, Brazil exported 974 million dollars of coffee only to Germany, the main buyer in the EU. The Brazilian exports of citrus, in 2016, corresponded to 712 million of dollars only to Belgium, the EU main buyer in 2016. As for soybean, Brazil exported nearly 1 billion and 644 million dollars only to Holland, the EU main buyer in 2016.

In Brazil, 121 different agrotoxins are authorized for coffee cultivation; however, 30 out of these are prohibited in the European Union, that is, ¼, or about 25%, as shown in Map "Brazil and European Union - Coffee Exports - Agrotoxins Authorized in Brazil and Prohibited in the E. U."

It is important to highlight that the major part of these agrotoxins have been prohibited in the EU since 2002, that is, for more than 15 years.

As for soybean there are 150 agrotoxins authorized for its cultivation in Brazil, but 35 out of these are prohibited in the EU (as shown in the Map "Brazil and European Union - Soybean Exports – Agrotoxins Authorized in Brazil and Prohibited in the E. U.").

In other words, 23% of the agrotoxins used in Brazil for the cultivation of soybean are prohibited in the EU and, just as in the case of coffee; a great part of them has been prohibited for more than 15 years in the EU.

And there are 116 agrotoxins authorized for citrus cultivation, out of which 33 are prohibited in the EU, that is, 28%, or almost 1/3. Just as in the cases of soybean and coffee, a large part of these agrotoxins has been prohibited in the EU since 2002. We highlight that Brazil is the largest exporter of orange juice in the world and the EU is its largest purchaser.

The information provided by these maps is fundamental to clarify the asymmetry in the use of agrotoxins between Brazil and the EU, since only for the three cultivations mentioned (soybean, coffee and citrus), 20 to 30% of the agrotoxins allowed in Brazil are banned in the EU. Besides the human and environmental contamination caused by agrotoxins in Brazil, there is in this process an ironic situation: part of the agrotoxins used in Brazil return to the countries of origin of their manufacturers – where they are prohibited – through the importation of food from Brazil.

This discussion of the dynamic of the globalized agriculture, in which countries that prohibit the use of poisons in their territory but consume poisoned products, has dated back to almost 10 years ago. An example is the paper written by Ryan E. Galt (2008) – in which he discusses what he calls the "circle of poison", describing how poisons "return" to their original countries by means of food imports that bring them back as residues in food. The circle of poison has, at one end, a company based in the EU and/or in the USA where agrotoxins are prohibited, producing them in countries such as Brazil, Argentina, Mexico, India among others. At the other end is the return of part of the active ingredients in the form of food (and/or commodities) imports to the countries where their producers are based.

The metaphor of the circle suggests at first sight a certain symmetry, in the sense that the

agrotoxins go back to where they came from. However, many other aspects of the use of agrotoxins in Brazil reveal a great asymmetry. In fact, we could say that what really returns to the countries where the agrotoxin companies are based is only a small portion of the consequences of the use of agrotoxins in Brazil.

2. The second face: how much is used. The difference between the quantity of agrotoxins used in Brazil and in the EU has two aspects: "upstream" and "downstream" the cultivations. The upstream aspect refers, at an early stage, to the difference in the volume of agrotoxins used in Brazil and in the EU in absolute terms (e.g.: in kg per hectare), which could be characterized as the upstream quantity of a cultivation that, in terms of human contamination, directly affects peasants, farm workers and rural populations living nearby cultivated areas contaminated by aerial spraying, for example.

To illustrate this difference, as methodologies and periods of data collection are diverse, the document entitled "Use of herbicides across Europe", published by the European Environment Agency (2008), presents the use of herbicides in the EU countries according to a scale varying from 0 to 2kg per hectare, with Belgium as the only country that uses more than 2 kg of herbicide per hectare. As for Brazil, considering the states of Bahia, Minas Gerais, São Paulo, and Mato Grosso do Sul, there is an average consumption of Glyphosate between 5 and 9 kg per hectare. And for the states of Rio Grande do Sul, Paraná, Goiás and Mato Grosso, in turn, the Glyphosate consumption ranges from 9 and 19 kg per hectare[41].

This first aspect, regarding the greater quantity of agrotoxins used in Brazil relatively to the EU, is the most evident, although it is not the only one. The second aspect is downstream the cultivations and is invisible: it regards the difference in the quantity of agrotoxin residues allowed in foods and water. Despite being invisible, it affects everybody, not only the rural population. In this case, we face an abyssal asymmetry, considering the agrotoxin residues officially allowed in Brazil and in the EU, either for foods or drinking water. The infocharts presented in this atlas demonstrate such asymmetry unequivocally.

The active ingredient Atrazine, the 7th best-selling agrotoxin in Brazil, and prohibited in the EU, has a Maximum Residue Limit (MRL) value in Brazil five times higher than the value permitted by the EU for sugarcane, corn and sorghum (0.25mg/kg for Brazil and 0.05mg/kg for the EU). As for Glyphosate, the MRL in Brazil is ten times higher than in the EU (respectively 1mg/kg and 0.1mg/kg) for coffee. In the case of sugarcane, the MRL of Glyphosate allowed in Brazil is 20 times higher than in the EU (1mg/kg in Brazil and 0.05mg/kg in the EU). As for soybean, this comparison exacerbates the term "asymmetry" applied to differences between Brazil and the EU due to the dimension of the "permissiveness" towards agrotoxin residues. For the Brazilian soybean the residue of Glyphosate allowed is 200 (two hundred) times the value permitted in the EU (10mg/kg in Brazil and 0.05mg/kg in the EU), as shown in the Infochart

41 See Map "Brazil – Sales of Glyphosate –-Federation Units".

"Brazil and European Union – Glyphosate – MRL – Soybean".

The total disparity in the levels regarded as tolerable from the point of view of human health in Brazil is not restricted only to the best-selling agrotoxins. At this point it is worth mentioning Malathion, a agrotoxin used in agriculture that is also used to fight insects that are vectors to tropical diseases, such as dengue and zika, in the so-called "public health campaigns".

The MRL for Malathion in the cultivation of broccoli in Brazil is 250 higher than the residue permitted in the EU (respectively 5mg/kg and 0.02mg/kg). For beans – symbol of Brazilian food and base product in the national "market basket" – the MRL of Malathion is 400 (four hundred) times the value permitted in the EU (respectively 8mg/kg and 0.02mg/kg).

It would be worth questioning whether it is possible to establish an "acceptable limit" to the ingestion of agrotoxins Supposing it is possible, we then wonder: what would be the parameter employed to establish that the amount of residue tolerable to human health in a given country is 250 or 400 times higher than in others? Behind this question clearly lies an indication of the place that Brazil and Latin America occupy in the globalized economy. They are worth less.

The uneven geography of the use and impacts of agrotoxins leads to a scenario in which a portion of humanity is literally worth less, being excluded from the most essential Human Right, which is the right to life itself. To complete this picture of asymmetry regarding the residues of agrotoxins officially permitted, we have the MRL of water. The importance to discuss the issue of water lies in the fact that it permeates both human and environmental health. Water contamination directly involves environmental contamination. Some of the examples introduced in our infocharts are worth mentioning.

Among the ten best-selling agrotoxins in Brazil, we have, as aforementioned, two which are prohibited in the EU: Atrazine and Acephate. The maximum residue limit of Atrazine in the Brazilian drinking water is 20 (twenty) times higher than the value permitted in the European Union. In the case of Acephate, the Brazilian legislation does not determine a maximum residue limit. The same happens with Malathion, used in public health campaigns and to which no maximum residue limit has been established for Brazilian drinking water.

In the case of 2.4-D, a herbicide that is the second best-selling agrotoxin in Brazil, the MRL allowed for Brazilian drinking water is 300 (three hundred) times higher than the value permitted in the EU. Maybe one of the most outstanding of these examples is the case of the Glyphosate limit allowed to be present in Brazilian "drinking" water, which is 5000 (five thousand) times higher than the limit established by the EU. These limits, or the absence thereof, established for some agrotoxin residues in the water are a dramatic proof that, in these cases, both the population and the environment are understood exclusively as resources.

3. The third face: how it is used. Brazilian cultivations such as soybean, corn, sugarcane, citrus and banana make intensive use of aerial spraying as a technique for the application of agrotoxins. The practice of aerial spraying causes a phenomenon named "drift", which refers to the quantity of agrotoxins that does not reach the "cultivation-target" and is dispersed in the environment.

According to the Brazilian National Association for Plant Protection (ANDEF) [42]:

> The drift, which is the displacement of the product broth outside the target desired, is directly influenced by local climatic conditions and is one of the major causes of environmental contamination and poisoning of populations.
>
> Factors which influence the drift are: wind, air temperature, relative humidity of the air, target distance (especially when applying small drops), application speed, and drop size.

Because of the potential environmental contamination and vulnerability to which the population ends up being exposed in cases of aerial spraying, according to the determination in the Directive 2009/128/EC13, article 9, this practice has been prohibited in the EU since 2009. According to this Directive, aerial spraying can only be authorized in the EU exceptionally, provided, the following conditions, among others, are met "There should be no viable alternatives or there should be clear advantages in terms of lesser harmful effects to human health and the environment as compared to the land application of agrotoxins"[43].

Maps of Section "Aerial Spraying of per Crop – São Paulo State" unequivocally demonstrate the increase in the use of this technique from 2013 to 2015. In 2013, the total area prayed corresponded to 2,075,759.44 hectares. In 2014, this number decreased a bit to 1,930,955.23, and in 2015, it reached 2,374,418.70 of hectares sprayed. When calculating the aerial spraying to elaborate these maps, we discarded the data on plantation and fertilization; therefore, the maps refer only to the application of agrotoxins.

The number of hectares is given by the sum of the areas sprayed; however, the same area is often sprayed more than once a year. In any case, if we add the amount of areas sprayed in the state of São Paulo along those three years, we reach the number of 6,374,418.37 hectares, which is equivalent to two land areas of Belgium. The main cultivation sprayed in the state of São Paulo is sugarcane, accounting for around 60% of the total of aerial pulverizations with agrotoxins; citrus is in the second place with around 20%, and banana is third, with around 15%.

The Map "– Aerial Spraying per Crop – São Paulo State", depicts a very significant portion of São Paulo – about 75% of its area – as sprayed with agrotoxins. Based on this we resume the metaphorical figure we have been forming, based on a three-pillar comparison between the use of agrotoxins in Brazil and in the EU, whose edges involves 1. *what* is used, 2. *how much* is used, and 3. *how* it is used.

Such is the disproportionality between the two tripods (Brazil and EU), each one with its three pillars, that the resulting figure is completely asymmetric. Therefore, we shall return to the

42 ANDEF - *Associação Nacional de Defesa Vegetal. Manual de Tecnologia de Aplicação de Produtos Fitossanitários*. Campinas, São Paulo, 2004. Available at: http://www.soagro.com.br/arquivos/pdf/manualaplicacao.pdf. (access on August 17, 2017)

43 Available at: http://eur-lex.europa.eu/legal-content/PT/ALL/?uri=CELEX%3A32009L0128 (access on September 22, 2017)

metaphor of the Minotaur. The permissiveness of the Brazilian Regulation to the presence of agrotoxin residues both in drinking water and in foods[44] offers room for reflection. If the Brazilian legislation permitted only the double of Glyphosate in drinking water in relation to the value allowed in the EU, for example, this would already illustrate the place occupied by Brazil in the International Division of Labor and, beyond that, in what is being characterized here as an *International Socioenvironmental Divison of Labor*, an International Geographical Division of Labor.

In this context, there is not only a difference between the North-South environmental regulatory determinations, but a real abyss. There is a portion of humanity – notably that part living in Latin America, Asia and Africa – that is daily exposed to a much higher level of public and environmental health vulnerability than the population living in the EU, for example.

V – FACE TO FACE WITH THE MINOTAUR: IMPACTS OF THE USE OF AGROTOXINS IN BRAZIL

Taking into account the feminine and masculine archetypal principles existing in complementarity in the classical forms of agriculture, forged millennially by the indigenous-peasant work, we see, in the opposite direction, capitalist agriculture turning them upside down, annihilating the feminine principle.

In a fine text written by two professors of the Department of Geography at USP, Rosely Pacheco and Regina Sader, entitled "Agriculture, Tradition and Modernity", the authors compare the riverside agriculture to the capitalist agriculture of soybean, making abundantly clear some central elements of their opposite logics. In the following citation, the authors clarify some of the impacts of using irrigation by means of the central pivot system:

> From this compaction derive two problems for agriculture. The first refers to the hydric system of the soil, since there is a decrease in the size of the pores of surface layers (up to 30 or 40 cm), which directly interferes with the speed of infiltration and circulation of water. The second regards the development of roots, which have their natural growth harmed by the resistance they find in crossing the thickened layer. As the macro-porosity decreases, it hampers the circulation of gravitational water, which also reduces its outflow and makes the soil permanently more humid and less aerated, providing an environment favorable to the development of fungi which, in turn, attack the roots. [...]
>
> All these processes subvert the cyclical time of the year, which means a temporality that evades the natural rules of the climatic cycle of the plants involved, which would not produce during periods of water shortfall. (SADER, R.; PACHECO, R. S/D. p.4-5)

The subversion of the cyclical time, as well as of the delicate environmental specificities of

44 Available at: http://portal.anvisa.gov.br/registros-e-autorizacoes/agrotoxicos/produtos/monografia-de-agrotoxicos

each biome[45], have led to what we may call the annihilation of the female principle, as the earth (soil) becomes potentially sterile and "sick" and needs to be "corrected". In this context, "soil correctors" come into play as if it were the case of each soil not to be correct in itself. And as a consequence of the agricultural practice explained in the previous citation, "fungicides" also emerge.

Brazil's role in the global economy and particularly in agriculture is a perfect demonstration of what Galeano (2010) refers to when he affirms that: "we have specialized ourselves in losing". And it is evident that these losses are not restricted to the scope of resources; they cause other developments, which unfold in many aspects of daily life as a harmful mark of the use of agrotoxins.

The loss incurred by Brazil as an agroexporting country is not limited to the aspect of resources. It should be questioned in a broader sense, in terms of what project of society and humanity we wish to build.

Therefore, this Atlas maps a very concrete situation, which is only the tip of the iceberg: it denounces something much more complex that refers to us all as a society. On this "tip of the iceberg" we verify that the use of agrotoxins, as it has been occurring in Brazil, has generated an undisputable impact on the health of the population as a whole, but especially of peasants and farm workers.

The entire set of maps "Poisoning by Agrotoxins" demonstrates the direct, visible impacts of the use of agrotoxins. Examples can be found in the Map "BRAZIL – Poisoning by Agrotoxin of Agricultural Use – Federation Units", that shows cases of poisoning by agrotoxins in Brazil between 2007 and 2014. The first aspect that draws our attention is a huge concentration of the poisoning cases reported, especially in the Center-South of Brazil. Paraná, for example, appears in first place with over 3700 poisoning cases notified. São Paulo and Minas Gerais had more than 2000 cases during the same period.

Altogether, the cases of agrotoxin poisoning reported to the Brazilian Ministry of Health accounted for over 25 thousand, which means an average of 3125 a year, or eight poisonings on a daily basis. It is worth clarifying, though, that it is estimated that for each poisoning case reported, there are 50 other cases not reported[46]. The cases represented in the map are therefore the "tip of the iceberg"[47] – only 2% of the total. Consequently, it is possible that there have been 1,250,000 (one million two hundred thousand and fifty) cases of poisoning by agrotoxins of agricultural use through that period.

It is also important to take into account the specificities of regional scope. The state of Mato Grosso, for example, presents the highest rate of agrotoxin use in the country, 17.7% of the total, consuming practically 1/5 of all agrotoxins commercialized in Brazil. It is not difficult to

45 On this subject see the section of maps with information on the cultivation and use of pesticides according to the biome.

46 BOCHNER, 2007.

47 It is important to highlight that these poisoning cases majorly regard acute cases, in which the poisoned individual accessed a health service. In general, it is difficult to report cases of chronic exposition to pesticides.

infer underreporting of poisoning cases in Mato Grosso, since the state of Bahia has more cases notified than Mato Grosso and, nonetheless, Bahia occupies the 7th place in terms of agrotoxin consumption, representing 5.3% of sales in Brazil.

The map "BRAZIL – Poisoning by Agrotoxin of Agricultural Use – Municipalities", presents the notified poisoning cases by municipality. By examining the map it is possible to observe at least three spatial profiles of agricultural poisoning: the area of soybean expansion, in the state of Mato Grosso and west of Bahia, along with municipalities of the east of the state of Tocantins and south of the states of Maranhão and Piauí; the area of sugarcane expansion in the west of São Paulo and Triângulo Mineiro (formed by the municipalities of Uberaba, Uberlândia and Araguari, in the state of Minas Gerais); and the area of irrigated fruit farming in the municipalities alongside the São Francisco River (states of Pernambuco and Bahia) and irrigated perimeters in the state of Ceará. The state of Paraná is also highlighted as an important soybean, sugarcane and wheat producer, and the state of Espírito Santo has significant cultivations of coffee and eucalyptus.

The map "BRAZIL – Poisoning by Agrotoxin of Agricultural Use – Circumstance presents the main situations that led to the poisoning notifications: "customary use", "accidental", and "suicide attempt". The first two categories of circumstance clearly denote cases of poisoning related to a work routine, that is, peasants and farm workers along with their families constitute the universe of those who may be daily poisoned by agrotoxins of agricultural use. Despite seeming "evident", these cases deserve to be discussed.

Nevertheless, what mostly calls the attention in this map is the large number of suicide attempts among the poisoning cases reported. The state of Paraná, for example, reported 1631 suicide attempts out of 3723 poisoning cases for that period, that is, around 40% of the total. The states of São Paulo and Minas Gerais also reported 40% of suicide attempts among the cases of poisoning by agrotoxins of agricultural use. Precisely, in São Paulo, there were 884 suicide attempts out of 2055 poisoning cases notified, while Minas Gerais presented 957 suicide attempts out of the 2186 poisoning cases notified.

However, in states of the Northeast region, such as Pernambuco and Ceará, the share of suicide attempts using agrotoxins reached over 70% of the total. From 2007 to 2014 in Pernambuco, 1145 out of 1545 poisoning cases reported corresponded to suicide attempts with the use of agrotoxins, that is, 74%. In Ceará, in the same period, there were 861 suicide attempts out of 1086 poisonings by agrotoxins, corresponding to 79.2%.

Only in 2013, the Brazilian Ministry of Health recorded 1796 suicide attempts using agricultural agrotoxins in Brazil. The maps "BRAZIL – Suicide Attempts Using Agrotoxins – Federation Units" and "BRAZIL – Suicide Attempts Using Agrotoxins – Municipalities" spatially depict the information presented in the two previous paragraphs.

Suicide cases, because of the severity of the situation and the legal aspects involved, obviously have a great importance in the number of poisoning cases reported, that is, they "become" official numbers. However, it is worth mentioning a possible correlation between these cases and

a chronic exposition to some types of agrotoxins[48]. According to the maps "BRAZIL – Death by Agrotoxin Poisoning – Federation Units" and "BRAZIL – Death by Agrotoxin Poisoning– Municipalities", over the past few years a portion of these poisoning cases caused death in Brazil.

The map organized by the Federation Units presents the state of Paraná leading the list of states with 231 deaths by agrotoxin poisoning over the period from 2007 to 2014. The state of Pernambuco is second in number of deaths, with 151 cases; São Paulo, Minas Gerais, and Ceará are third with 83 deaths for the same period. Altogether, there were 1186 cases of death from poisoning by agrotoxin of agricultural use in the country, which means an average of 148 deaths per year, the equivalent to one death every two days and a half.

The cases of babies (children from 0 to 12 months) poisoned explicitly reveal the level of agrotoxin exposure to which the population as a whole is subjected. As presented in the three maps approaching the cases of poisoning in babies "BRAZIL Babies Poisoned by Agrotoxins – Federal Units; "BRAZIL – Babies Poisoned with Agrotoxins – Municipalities", and "BRAZIL –

Babies Poisoned with Agrotoxins – Municipalities/Federation Units", there were over 300 cases of poisoned babies notified for the period from 2007 to 2014, that is, an average of 42 babies annually poisoned by agrotoxins.

We emphasize two elements regarding poisoned babies: the first is that these children are at an early stage of life, when they are not able to move by themselves and/or without the presence of adults. This consequently indicates environmental exposition to agrotoxins. The second element is underreporting. If in official numbers we had 343 babies poisoned for that period, the actual number is likely to have reached over 17 thousand, considering that for each case reported, 50 are not reported.

The case of poisoned babies, even if restricted to official numbers, is a symptom of the impact of agrotoxin use in Brazil. The Brazilian Child and Adolescent Statute, Law 8069 of July 13, 1990, presents, in its first article, the fundamental role of guaranteeing "full protection of\ children and adolescents". As demonstrated in the aforementioned maps, as well as in the Map "BRAZIL – Poisoning by Agrotoxin – Age Group", a major part of poisoning cases happens with children and teenagers. Indeed, in most part of the Brazilian Federation Units, the number of poisoned children and teenagers corresponds roughly to 20% of the total poisonings reported, as is the case of São Paulo, Paraná, Santa Catarina, Rio Grande do South, and Mato Grosso, among others.

In some states, the number of poisoned children and teenagers reaches practically 25% of the total of cases reported. This is what has been occurring, for example, in the sates of Ceará,

48 Many scientific papers published in Brazil (and other countries as well) demonstrate a correlation between the exposition to some types of pesticides, especially organophosphates, and a higher rate of suicide attempts related in the population exposed. Among these papers, we highlight ARAÚJO et al. (2007) and PIRES, D. X.; CALDAS, E. D.; RECENA, M. C. (2005). See also details on this approach in BOMBARDI, (2011).

Pernambuco, Sergipe, Bahia, and Tocantins. We believe that the fact that 20% to 25% cases of agrotoxin poisoning in Brazil involve children and teenagers, besides demonstrating an absolute indifference to the Law of full protection to this age group, means that we are metaphorically "face to face with the Minotaur".

VI. FINAL REMARKS: SEEKING TO ESCAPE THE LABYRINTH BY MEANS OF ARIADNE'S THREAD

We refer once more to Eduardo Galeano to conclude the considerations made here. In his preface to the 2010 Brazilian edition of *Latin America's Open Veins*, the author proposes the following enquiry, followed by a substantial reflection:

> Is the past mute? Or do we continue to be deaf?
>
> *Latin America's Open Veins* emerged with the aim of spreading unknown information. The work encompasses many themes, but maybe none of them is so current as this obstinate routine of disgrace: monoculture is prison. Diversity, on the contrary, sets one free.
>
> Independence is restricted to the anthem and the flag if it is not grounded on food sovereignty. Only productive diversity can defend us from the deadly strikes of international quotation that offers bread for today and hunger for tomorrow. Self-determination comes from the mouth. (GALEANO, 2010, p. 5, our emphasis)

The expression "self-determination comes from the mouth" offers us the end of Ariadne's thread, so that we can pull it and find the way back. Ariadne, not by accident, is a female archetypal image. She is the one building the bridge between the inner and the outer world. In this text, we resort to her archetype to reflect on the power of discussing food both to reveal what has been hidden and to promote transformation.

On a first consideration, we could say that the massive use of agrotoxins supports an agriculture which, accomplished intensively and by means of monocultures, demands an agrochemical package. This brings up a natural question: does the capitalist agriculture demand an agrochemical package or does the chemical industry demand a certain type of agriculture? We propose that both are true. Here we reaffirm the existence a dialectic of double-determination.

We must consider that, unlike what happens in manufacturing, in agriculture, be it peasant or capitalist, the period of production cannot be fully controlled; neither is possible a complete standardization or an absolute prediction, even though the expression "precision agriculture" does exist. This means that in agriculture the capital also reproduces indirectly through the subordination of the income of the land.[49] As Oliveira reminds us, in the capitalist mode of production there is a contradiction between land and capital:

49 OLIVEIRA, 2007; BOMBARDI, 2011.

> Therefore, a land property should not be understood as an obstacle to the expansion of capitalist production relationships in the field, but as a fundamental contradiction of the capitalist mode of production; it is the tax that the capital has to pay, without which it will not be able to expand in agriculture and dominate the work in the field. (OLIVEIRA, 2010, p.7)

Either this contradiction "transcends" itself through the acquisition of land directly by the capital (which would imply a territorialization of the capital) or, if not, it imposes a subordination: it subjects the income of the land to the capital:

> In the contradictory process of appropriation of the income of the land by the capital, we observe, on the one hand, the landowner and the capitalist merging into just one individual; on the other hand, we witness the submission of the income to the capital in non-capitalist production sectors, for example, in the case of peasant family properties. In this instance, we have the subjection of the income of the land to the capital without the expropriation of production instruments. (OLIVEIRA, 2010, p. 9)

As stated here before, capitalist agriculture has expanded enormously over the past few years; what we have, therefore, is a classic case of enlarged reproduction of capital. However, this is not a homogeneous movement; the whole process is contradictory: from the subjection of the income of the land to the capital to the necessity of non-capitalist relationships "needed for the reproduction of capital" (OLIVEIRA, 2007; LUXEMBURGO, 1970) that work as forms of production of capital that are simultaneous to the reproduction of capital.

Furthermore, it should be considered that the State has acted to subsidize the capital and, between the conflicting interests of the agrochemical industry and capitalist agriculture, we can see the State subsidizing both.

Brazil currently offers a reduction of 60% in the ICMS (Brazilian tax on the circulation of goods and services) and full tax exemption both in PIS/COFINS and IPI (other Brazilian tributes), for production and commerce of agrotoxins[50]. According to public defender Marcelo Novaes, only for the state of São Paulo, it is estimated that in 2015 the government missed out on roughly 1.2 billion *reais*[51] in tax exemptions involving agrotoxins[52]. Partial or full exemption of taxes is a mechanism of the State to subsidize the capital[53]. The financing of the capital by the State in the agrochemical sector indicates two movements: the first and more apparent one involves the favoring of the capitalist class to the detriment of the other social classes.

50 Available at: https://brasil.elpais.com/brasil/2016/03/03/politica/1457029491_740118.html and http://www.canelrural.com.br/noticias/rural-noticias/insumos-mantem-desconto-icms-mas-agrotoxicos-podem-perder-beneficio-2018-69159

51 Real is the Brazilian currency: 1 USD = 3,85558 BRL on average.

52 Available at: http://www.redebrasilatual.com.br/economia/2017/10/com-incentivos-tributarios-aos-agrotoxicos-sao-paulo-deixa-de-arrecadar-r-1-2-bilhao-ao-ano

53 Available at: TAVARES DOS SANTOS, 1978.

The second and less apparent movement is that the State has completely merged the interests of large landowners to those of the agrochemical industry. At this phase of globalization of Brazilian agriculture, especially from the years of 2000 on, there has been a significant increase in the production of commodities and what we may call "agroenergy-crops" in peasant lands, lands with native vegetal covering, and unproductive lands already deforested (including many untitled federal lands). The set of Maps addressing Brazilian biomes and these cultivations demonstrates it unequivocally.

Therefore, in a direction opposite to a large, massive agrarian reform, with food production and the building food sovereignty, our global agriculture has subverted the perspective of self-determination.

In this context, since the cutback in the II *Plano Nacional de Reforma Agrária* (2nd National Plan for Agrarian Reform, which was authored by the team of Plínio de Arruda Sampaio during the first term of President Luis Inácio Lula da Silva), the indigenous-peasant utopia, along with the utopia of the other subaltern classes which had been articulating with those social subjects along the decade of 1990, has been turned on its head[54].

This rupture with social movements foreshadowed what was about to come: the consolidation of Brazil as a vast territory to produce commodities and agroenergy, to such an extent that we have a "surreal" equivalent of 5.5 times the territory of Portugal, or 16.8 times that of Belgium or 6.4 times that of Scotland reduced to sugarcane, soybean and eucalyptus crops.

Such a socioenvironmental misery – therefore a Geographic misery – to which these vast areas of the country are reduced has brought about a direct impact on the population and, we emphasize, not only the rural population of the country, as indicated in the set of maps and infocharts constituting this Atlas. Environmental contamination[55], poisoning[56], suicide attempts[57], congenital malformations[58], and chronic diseases[59] are only the more apparent consequences of an issue that is directly linked to the Brazilian agrarian question and the mechanisms of reproduction of capital in the field.

To conclude this text, we shall return to the female and male archetype principles: the earth/soil in Brazil, instead of having been fertilized by the peasant work (with agroecological practices, for example) has been literally violated by agricultural practices that allow the capital to reproduce, but that, taking the situation to the limit, prohibit human existence as far as they cause the earth (soil) to be sick, which extends to the environment, to farm workers and, more

54 On this subject, see: OLIVEIRA, 2007.

55 PIGNATTI, W. A.; MACHADO, J.M.H.;CABRAL, J.F. 2007. and CARNEIRO, F. 2015.

56 BOMBARDI, L. M. 2011; 2016.; MENCK, V. 2015.

57 BOMBARDI, L. M. 2011; 2013. ; ARAÚJO, A. J. et al 2007; PIRES, D. X., CALDAS, E. D., RECENA, M. C. 2005.

58 DUTRA, L. S.; FERREIRA, A. P. 2017.

59 RIGOTTO, R. 2011.; CARNEIRO, F. 2015.; HESS, S., NODARI, R. 2015.

largely, to the population as a whole.

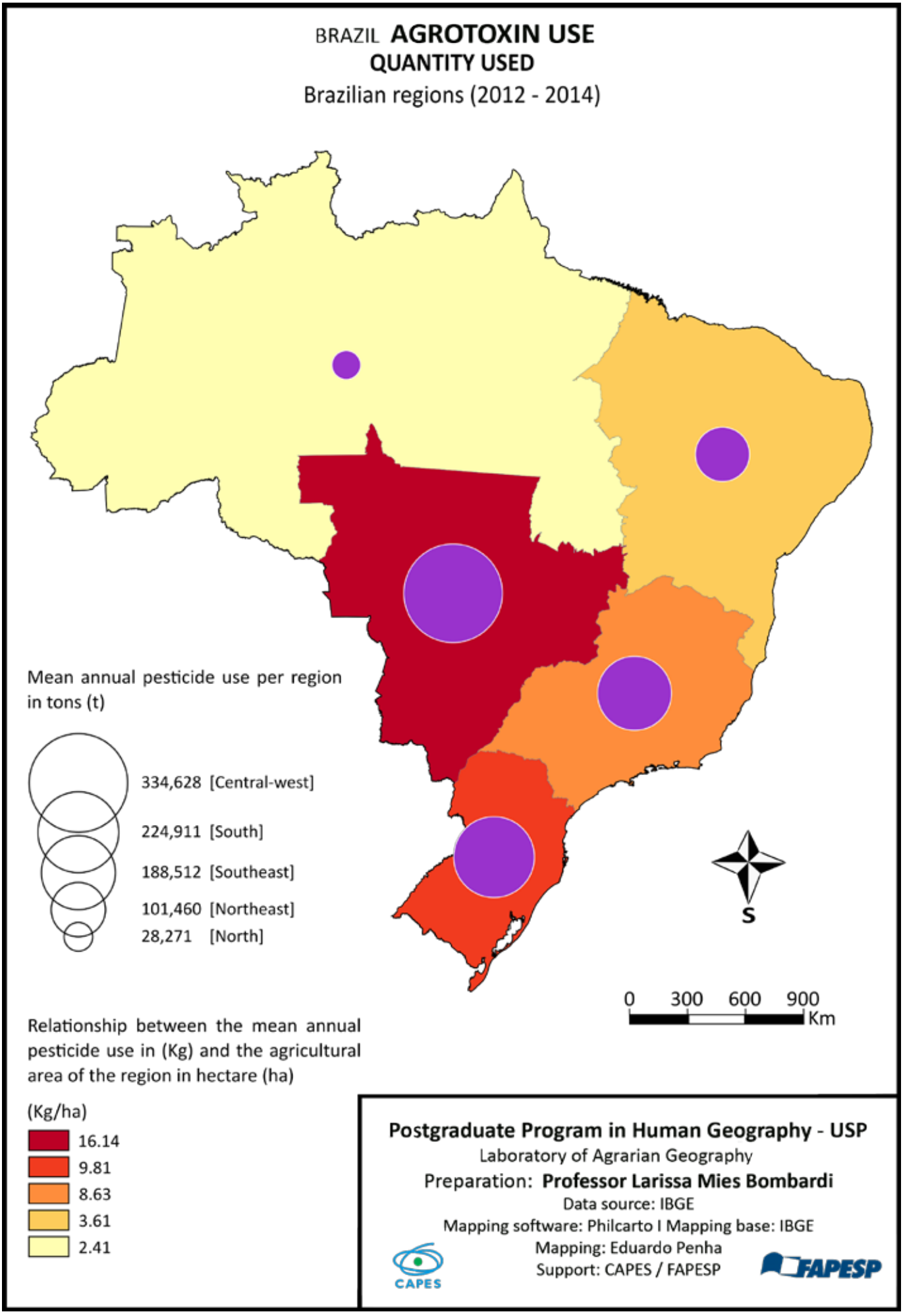
Pulling Ariadne's thread will be therefore to regain and reconsider the place of food in our society and – as Galeano stated – consider that self-determination comes from the mouth.

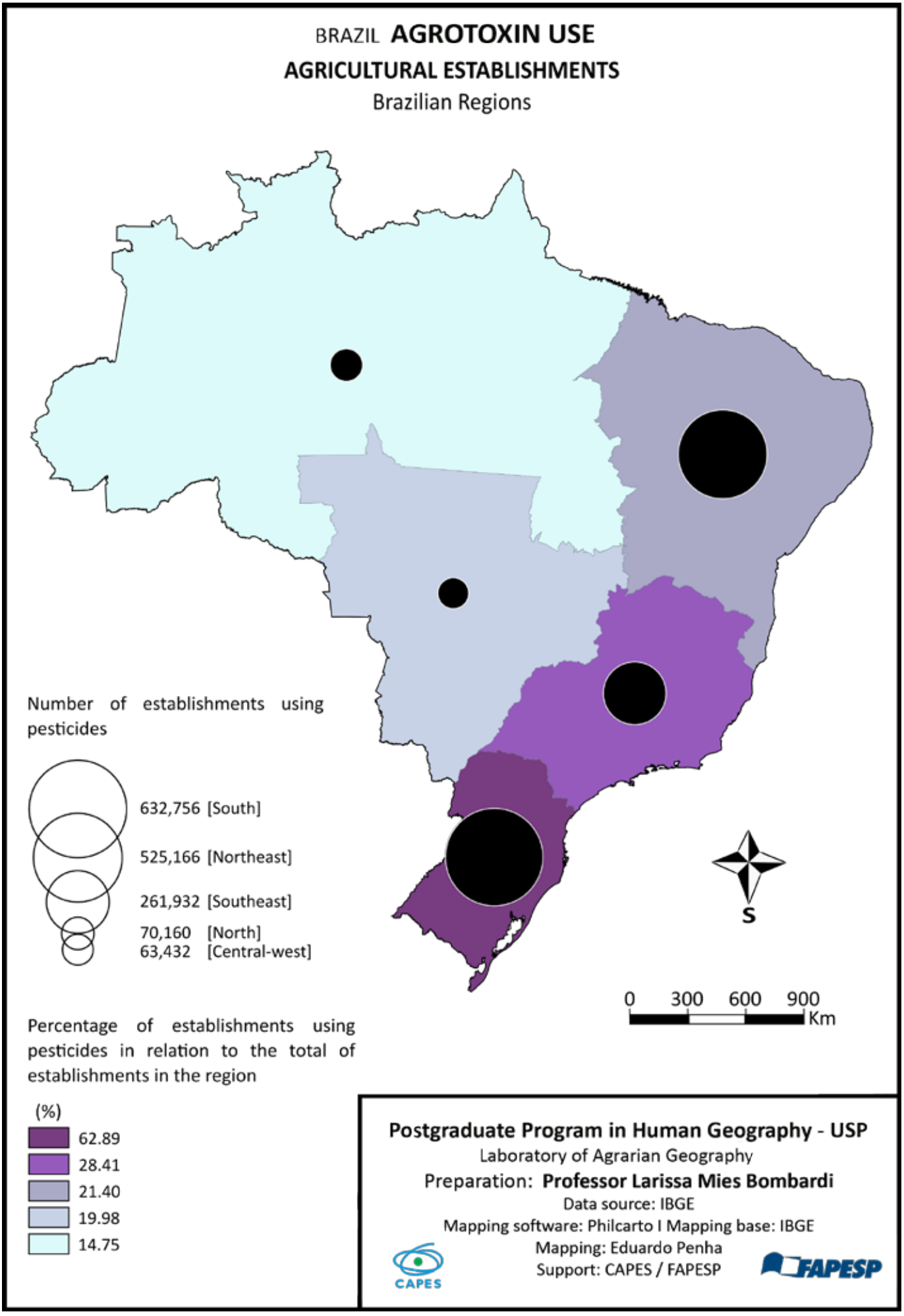
Finally, pulling "Ariadne's thread" will be a possibility of transformation for this society, a transformation that comes "*from the mouth*", uniting – by means of this thread – the agrarian and the urban issues and bringing us "back home" E(e)arth.

ATLAS


BRAZIL FEDERATION UNITS AND REGIONS
Roraima
Amapá
Amazonas
Pará
Rio Grande do Norte
Maranhão
Ceará
Paraíba
Piauí
Pernambuco
Acre
Alagoas
Tocantins
Rondônia
Sergipe
Bahia
Mato Grosso
Distrito Federal
Goiás
Minas Gerais
Mato Grosso do Sul
Espírito Santo
São Paulo
Rio de Janeiro
Paraná
Santa Catarina
Rio Grande do Sul
S
0 300 600 900
Km
NORTH
NORTHEAST
CENTRAL -WEST
SOUTHEAST
SOUTH
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

BRAZIL **AGROTOXIN USE**


BRAZIL AGROTOXIN USE
QUANTITY USED
Brazilian regions (2012 - 2014)
Mean annual pesticide use per region in tons (t)
334,628 [Central-west]
224,911 [South]
188,512 [Southeast]
101,460 [Northeast]
28,271 [North]
S
0 300 600 900 Km
Relationship between the mean annual pesticide use in (Kg) and the agricultural area of the region in hectare (ha)
(Kg/ha)
16.14
9.81
8.63
3.61
2.41
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Brazilian Regions
Number of establishments using pesticides
632,756 [South]
525,166 [Northeast]
261,932 [Southeast]
70,160 [North]
63,432 [Central-west]
S
0 300 600 900
Km
Percentage of establishments using pesticides in relation to the total of establishments in the region
(%)
62.89
28.41
21.40
19.98
14.75
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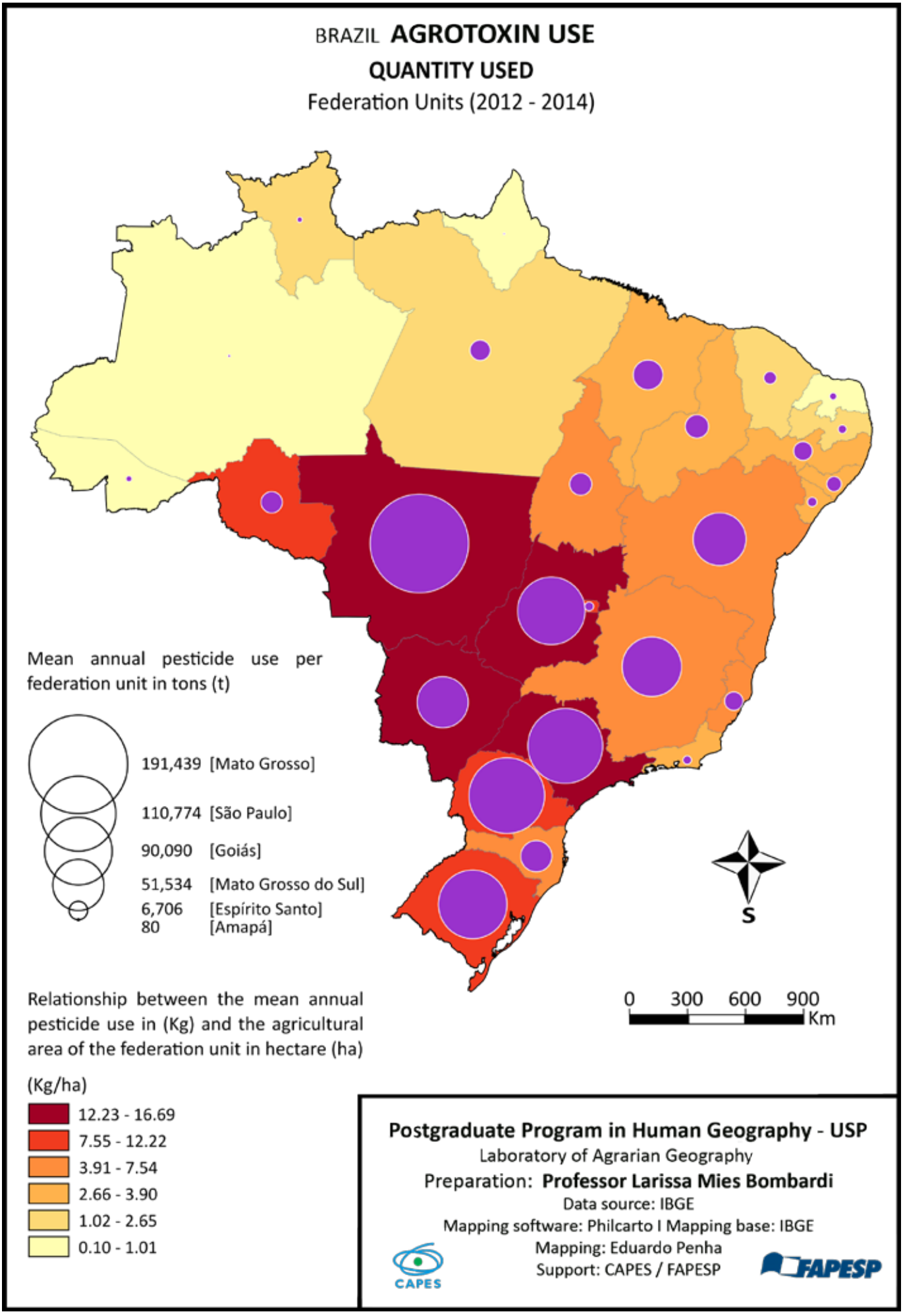
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL AGROTOXIN USE
QUANTITY USED
Federation Units (2012 - 2014)
Mean annual pesticide use per federation unit in tons (t)
191,439 [Mato Grosso]
110,774 [São Paulo]
90,090 [Goiás]
51,534 [Mato Grosso do Sul]
6,706 [Espírito Santo]
80 [Amapá]
S
0 300 600 900 Km
Relationship between the mean annual pesticide use in (Kg) and the agricultural area of the federation unit in hectare (ha)
(Kg/ha)
12.23 - 16.69
7.55 - 12.22
3.91 - 7.54
2.66 - 3.90
1.02 - 2.65
0.10 - 1.01
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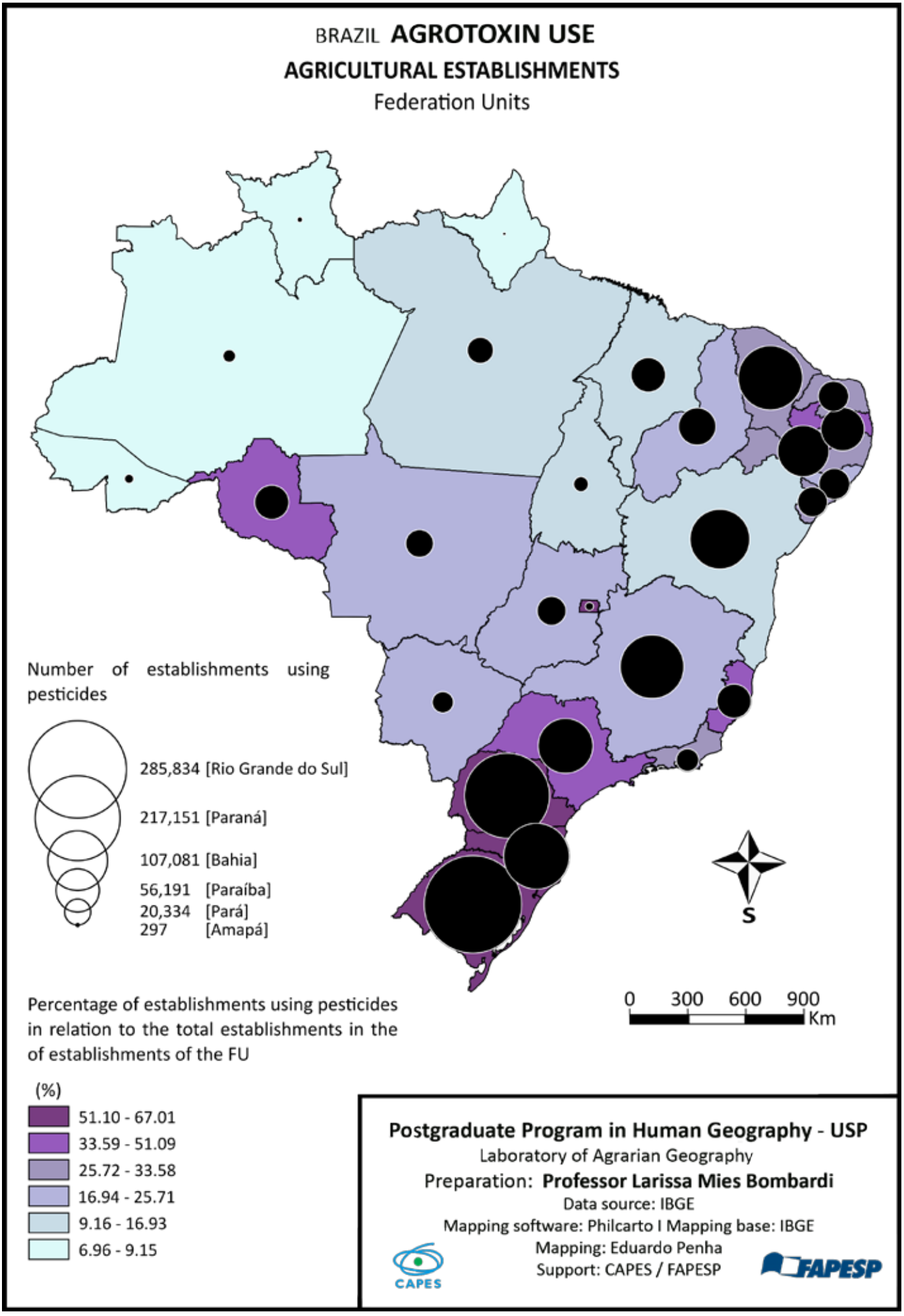
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Federation Units
Number of establishments using pesticides
285,834 [Rio Grande do Sul]
217,151 [Paraná]
107,081 [Bahia]
56,191 [Paraíba]
20,334 [Pará]
297 [Amapá]
S
0 300 600 900
Km
Percentage of establishments using pesticides in relation to the total establishments in the of establishments of the FU
(%)
51.10 - 67.01
33.59 - 51.09
25.72 - 33.58
16.94 - 25.71
9.16 - 16.93
6.96 - 9.15
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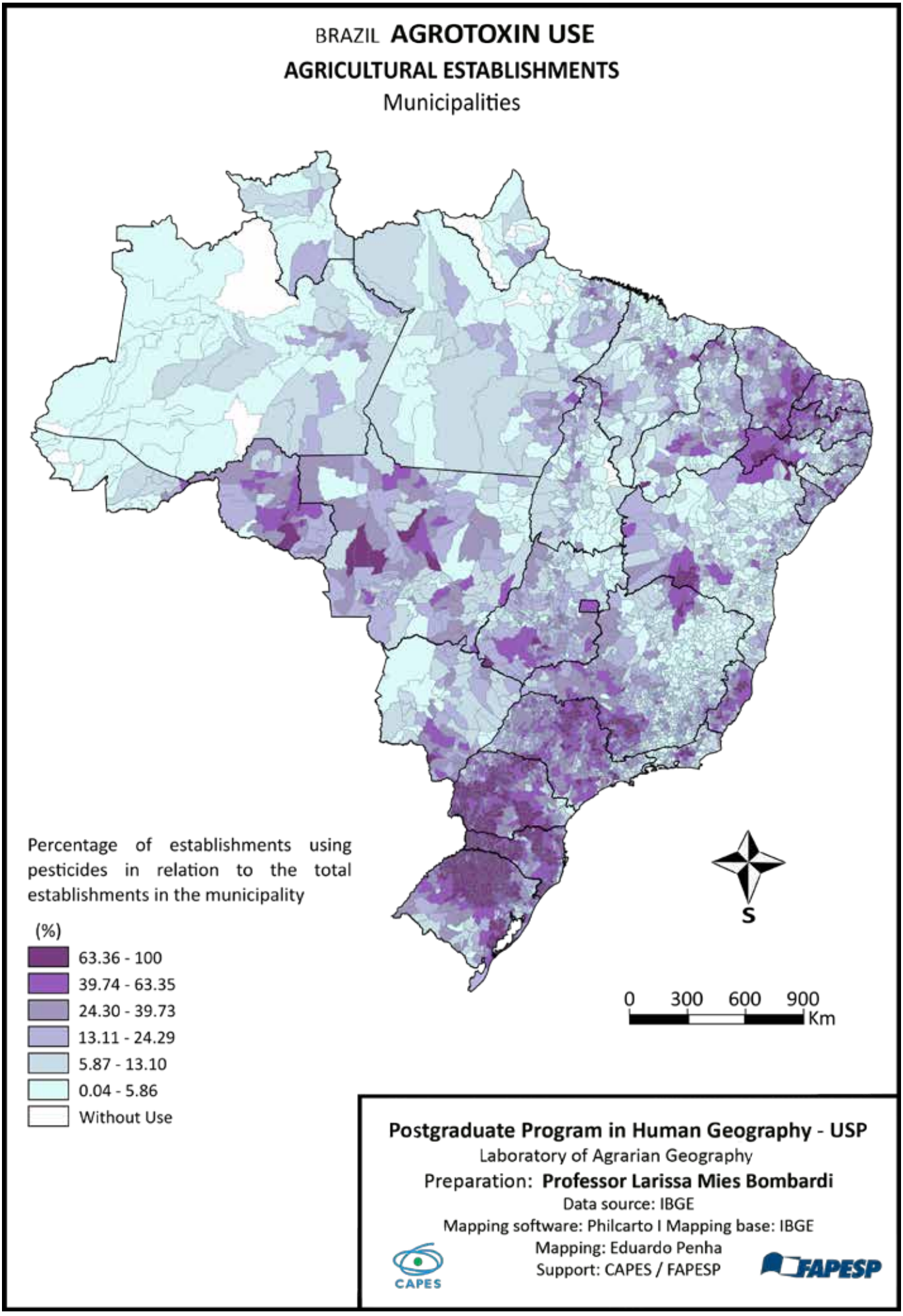
CAPES
FAPESP


BRAZIL AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Percentage of establishments using pesticides in relation to the total establishments in the municipality
(%)
63.36 - 100
39.74 - 63.35
24.30 - 39.73
13.11 - 24.29
5.87 - 13.10
0.04 - 5.86
Without Use
S
0 300 600 900
Km
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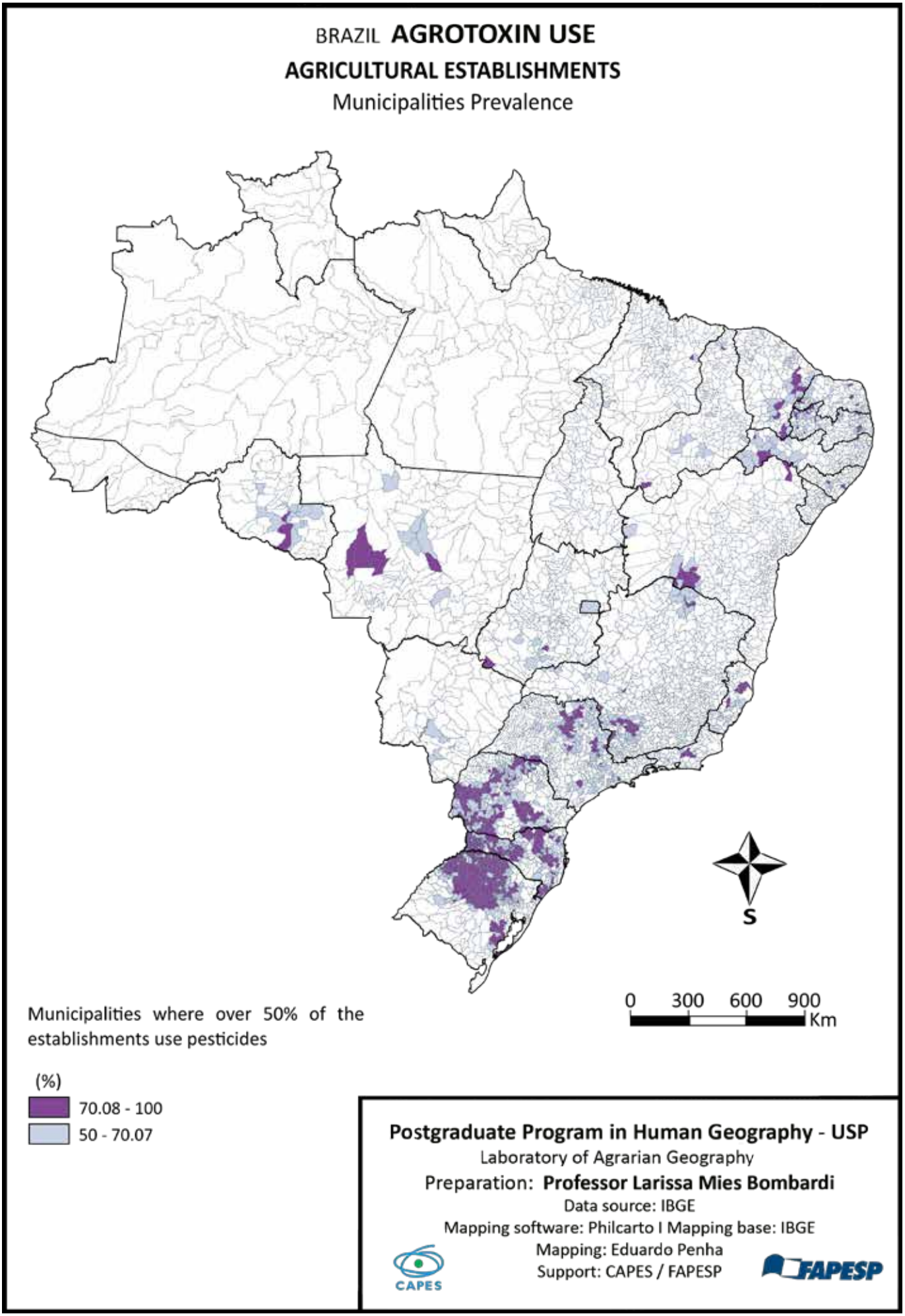
CAPES
FAPESP


BRAZIL AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities Prevalence
S
0 300 600 900
Km
Municipalities where over 50% of the establishments use pesticides
(%)
70.08 - 100
50 - 70.07
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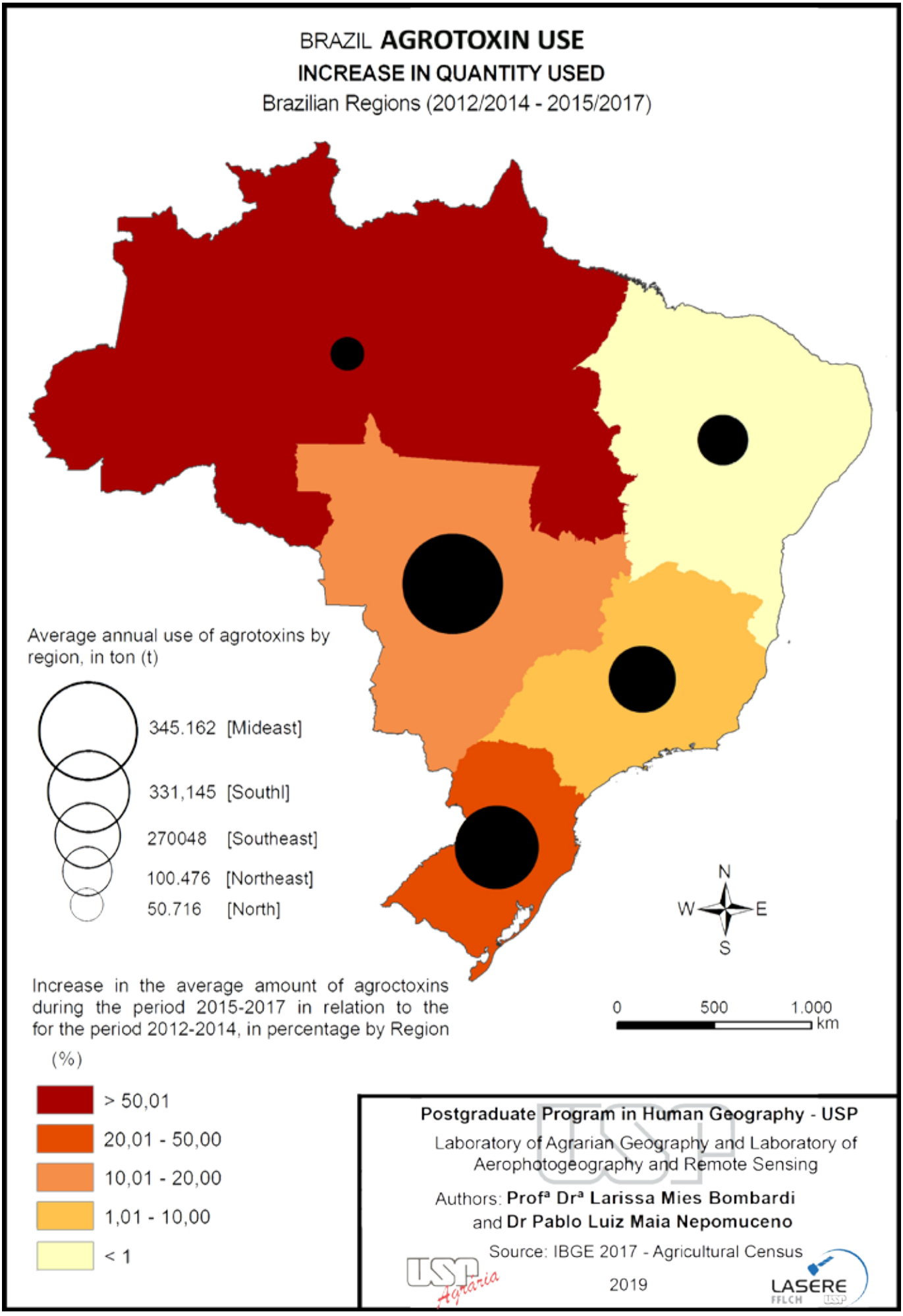
BRAZIL AGROTOXIN USE
INCREASE IN QUANTITY USED
Brazilian Regions (2012/2014 - 2015/2017)
Average annual use of agrotoxins by region, in ton (t)
345.162 [Mideast]
331,145 [Southl]
270048 [Southeast]
100.476 [Northeast]
50.716 [North]
N
W
E
S
Increase in the average amount of agroctoxins during the period 2015-2017 in relation to the for the period 2012-2014, in percentage by Region
(%)
> 50,01
20,01 - 50,00
10,01 - 20,00
1,01 - 10,00
< 1
0
500
1.000
km
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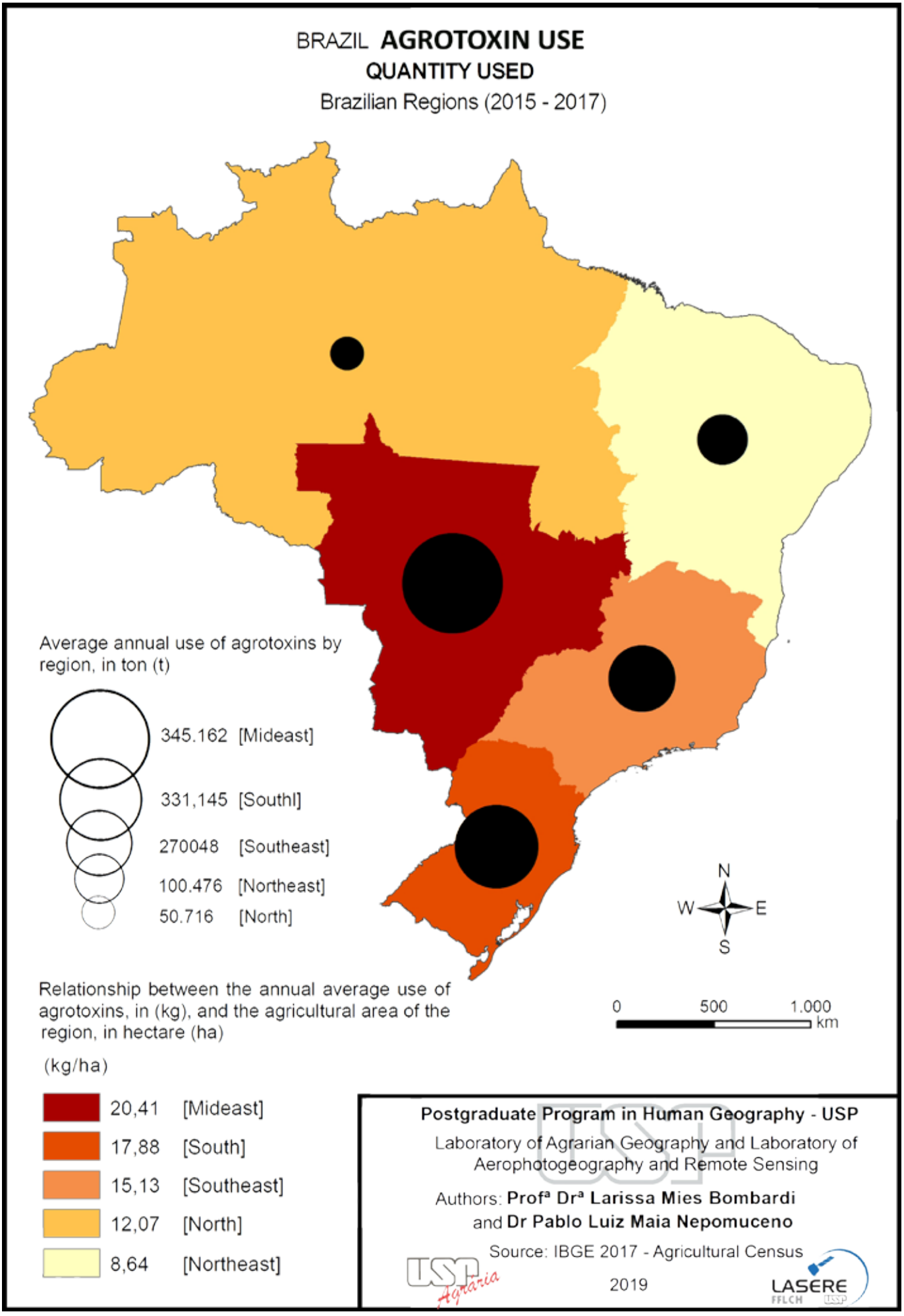
Laboratory of Agrarian Geography and Laboratory of Aerophotogeography and Remote Sensing
Authors: Profª Drª Larissa Mies Bombardi and Dr Pablo Luiz Maia Nepomuceno
Source: IBGE 2017 - Agricultural Census
2019
USP Agraria
LASERE FFLCH USP


BRAZIL AGROTOXIN USE
QUANTITY USED
Brazilian Regions (2015 - 2017)
Average annual use of agrotoxins by region, in ton (t)
345.162 [Mideast]
331,145 [Southl]
270048 [Southeast]
100.476 [Northeast]
50.716 [North]
N
W
E
S
0
500
1.000
km
Relationship between the annual average use of agrotoxins, in (kg), and the agricultural area of the region, in hectare (ha)
(kg/ha)
20,41 [Mideast]
17,88 [South]
15,13 [Southeast]
12,07 [North]
8,64 [Northeast]
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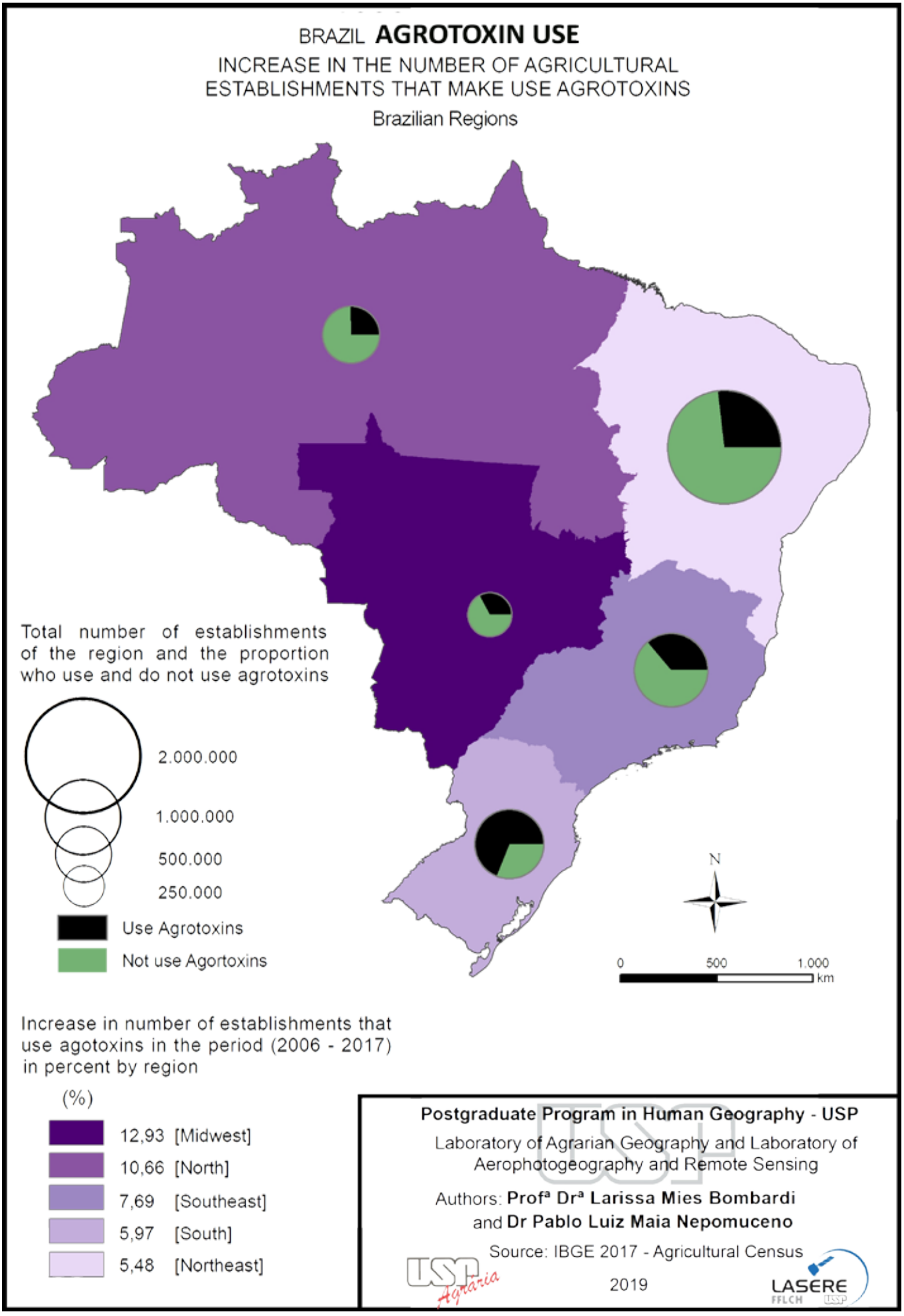
Laboratory of Agrarian Geography and Laboratory of Aerophotogeography and Remote Sensing
Authors: Profª Drª Larissa Mies Bombardi
and Dr Pablo Luiz Maia Nepomuceno
Source: IBGE 2017 - Agricultural Census
2019
USP Agrária
LASERE FFLCH USP


BRAZIL AGROTOXIN USE
INCREASE IN THE NUMBER OF AGRICULTURAL ESTABLISHMENTS THAT MAKE USE AGROTOXINS
Brazilian Regions
Total number of establishments of the region and the proportion who use and do not use agrotoxins
2.000.000
1.000.000
500.000
250.000
Use Agrotoxins
Not use Agortoxins
N
0
500
1.000
km
Increase in number of establishments that use agotoxins in the period (2006 - 2017) in percent by region
(%)
12,93 [Midwest]
10,66 [North]
7,69 [Southeast]
5,97 [South]
5,48 [Northeast]
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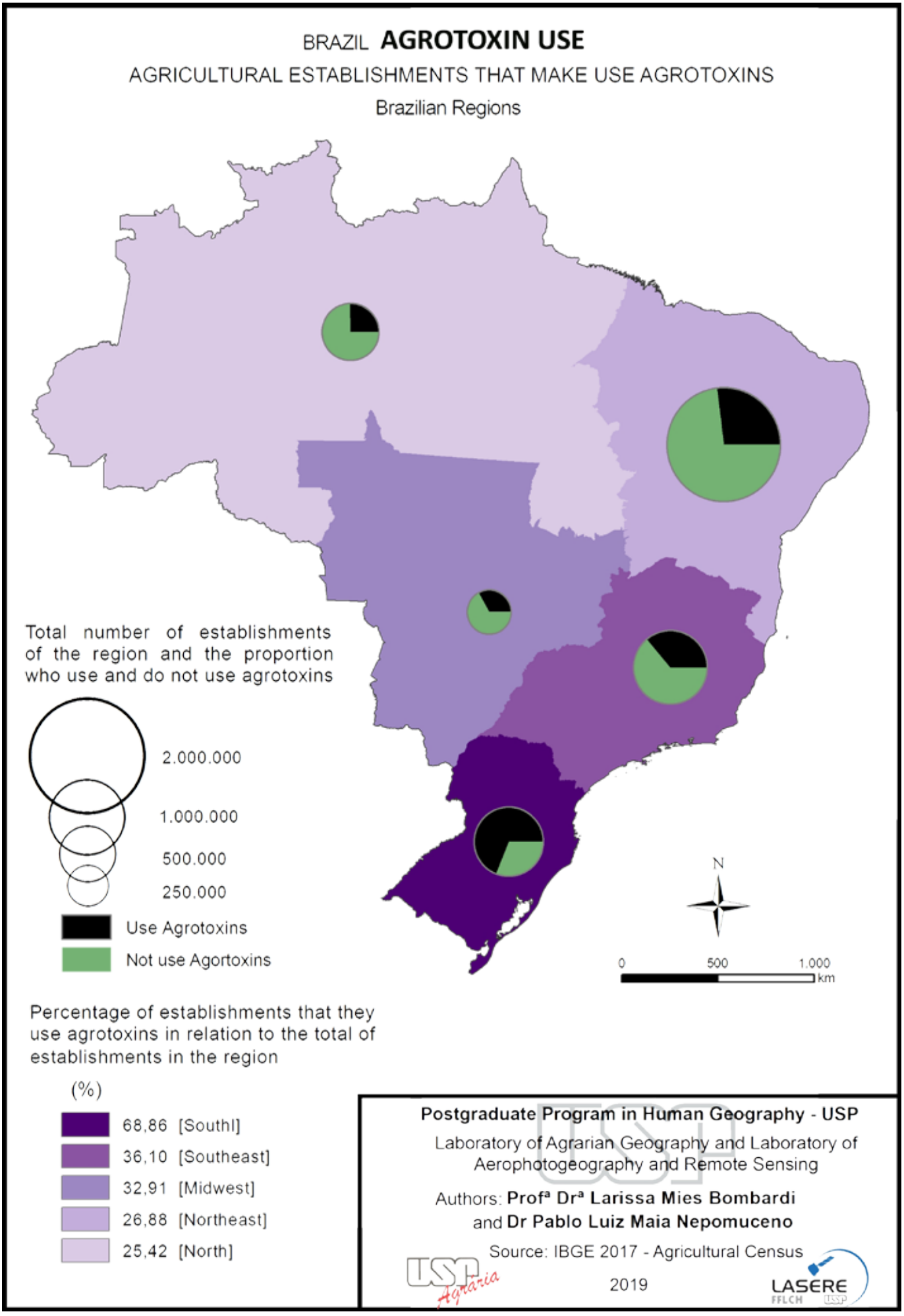
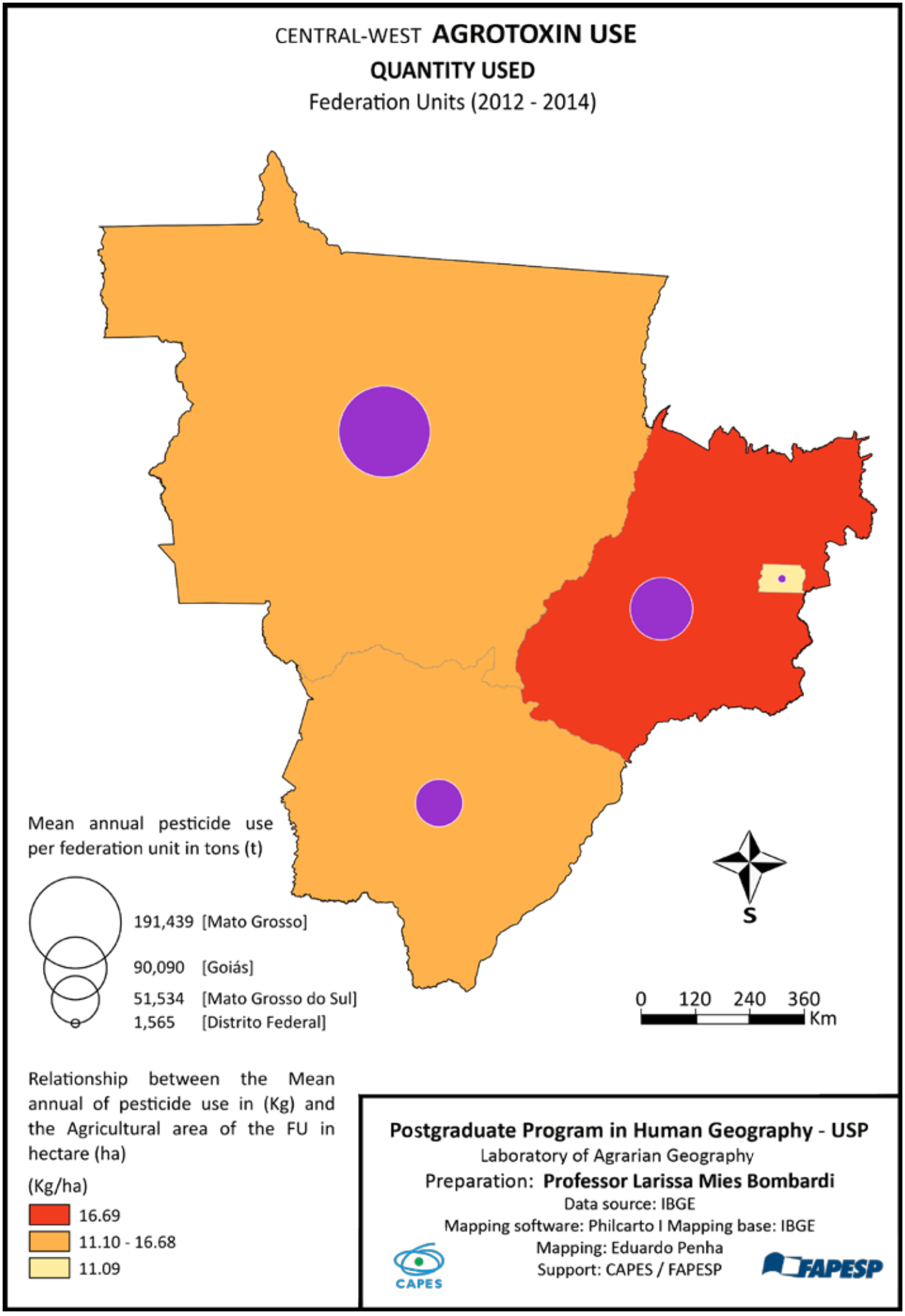
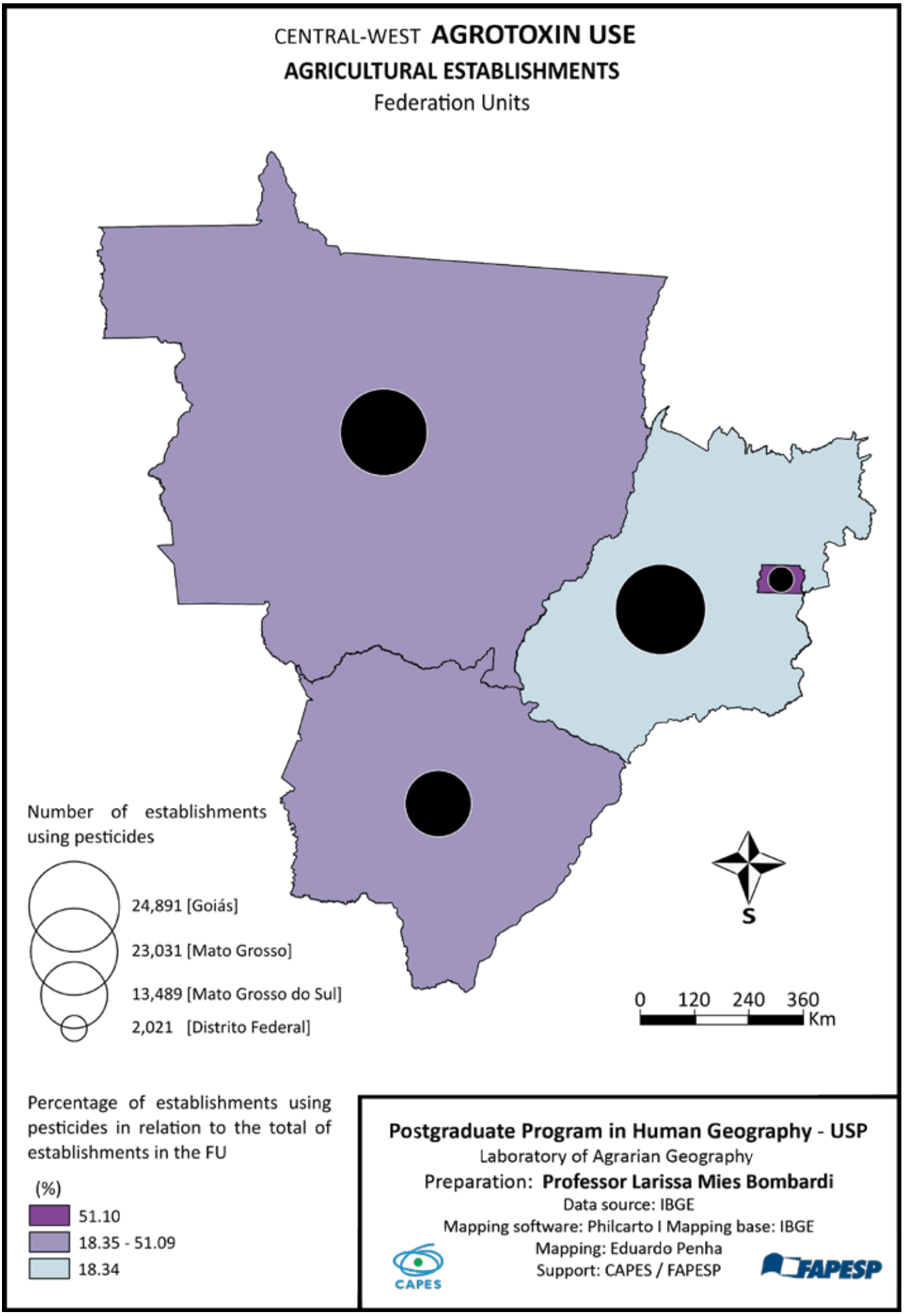
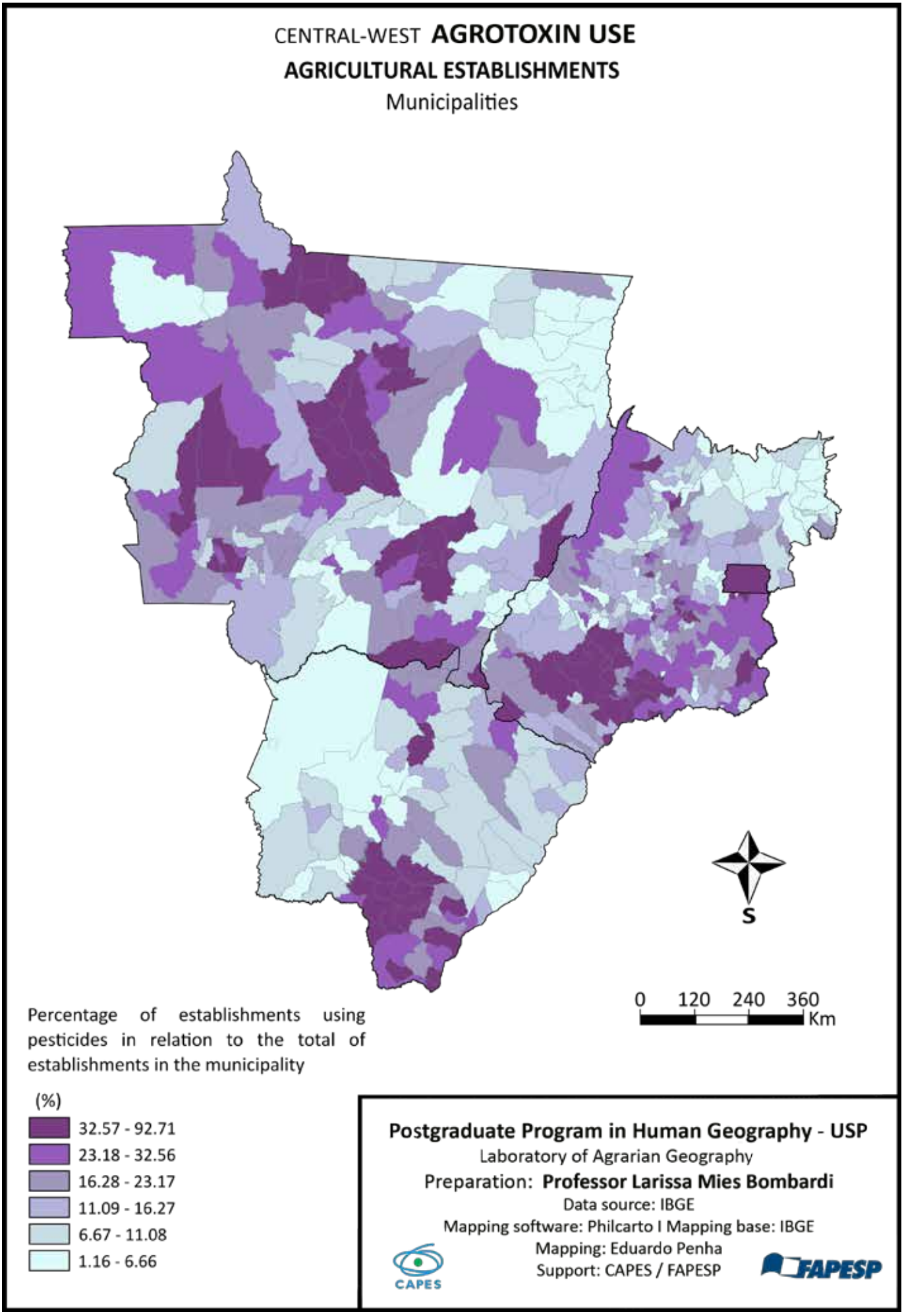
Laboratory of Agrarian Geography and Laboratory of Aerophotogeography and Remote Sensing
Authors: Profª Drª Larissa Mies Bombardi and Dr Pablo Luiz Maia Nepomuceno
Source: IBGE 2017 - Agricultural Census
2019
LASERE
FFLCH
USP

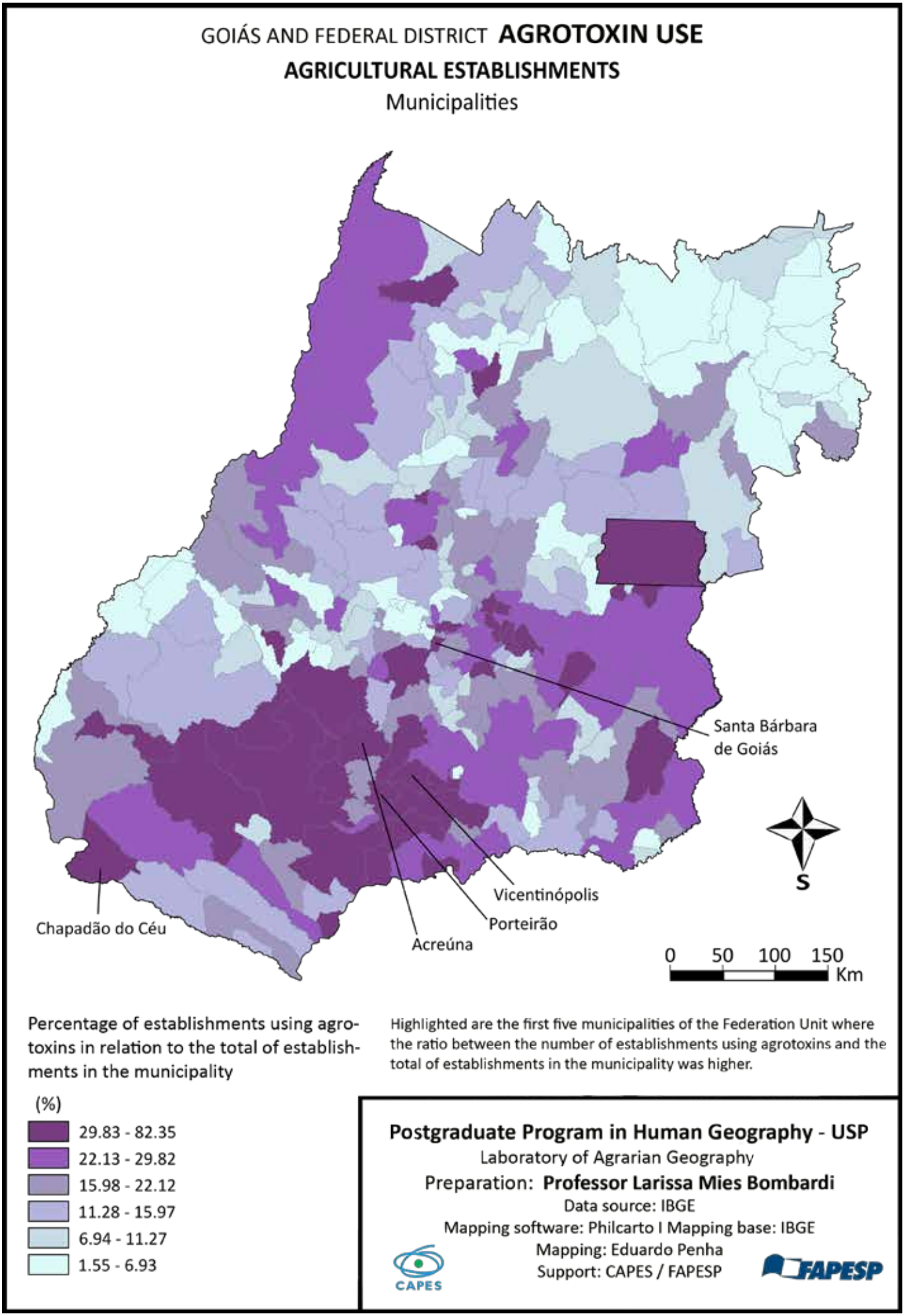

BRAZIL AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS THAT MAKE USE AGROTOXINS
Brazilian Regions
Total number of establishments of the region and the proportion who use and do not use agrotoxins
2.000.000
1.000.000
500.000
250.000
Use Agrotoxins
Not use Agortoxins
N
0
500
1.000
km
Percentage of establishments that they use agrotoxins in relation to the total of establishments in the region
(%)
68,86 [Southl]
36,10 [Southeast]
32,91 [Midwest]
26,88 [Northeast]
25,42 [North]
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography and Laboratory of Aerophotogeography and Remote Sensing
Authors: Profª Drª Larissa Mies Bombardi
and Dr Pablo Luiz Maia Nepomuceno
Source: IBGE 2017 - Agricultural Census
2019
Agrária
LASERE
FFLCH

CENTRAL-WEST **AGROTOXIN USE**


CENTRAL-WEST AGROTOXIN USE
QUANTITY USED
Federation Units (2012 - 2014)
Mean annual pesticide use per federation unit in tons (t)
191,439 [Mato Grosso]
90,090 [Goiás]
51,534 [Mato Grosso do Sul]
1,565 [Distrito Federal]
S
0 120 240 360
Km
Relationship between the Mean annual of pesticide use in (Kg) and the Agricultural area of the FU in hectare (ha)
(Kg/ha)
16.69
11.10 - 16.68
11.09
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


CENTRAL-WEST AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Federation Units
Number of establishments using pesticides
24,891 [Goiás]
23,031 [Mato Grosso]
13,489 [Mato Grosso do Sul]
2,021 [Distrito Federal]
S
0 120 240 360
Km
Percentage of establishments using pesticides in relation to the total of establishments in the FU
(%)
51.10
18.35 - 51.09
18.34
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

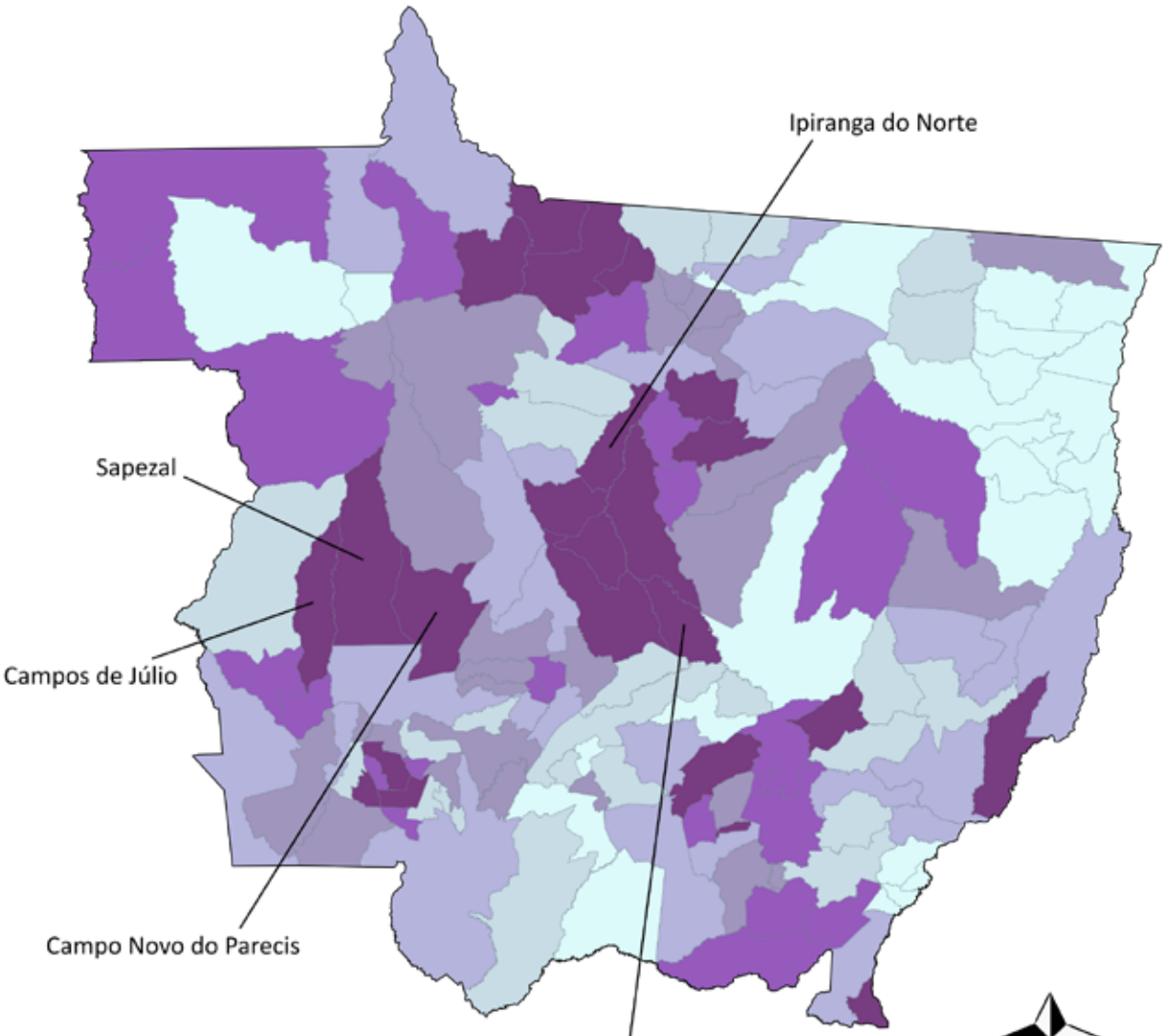

CENTRAL-WEST AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
S
0 120 240 360
Km
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
32.57 - 92.71
23.18 - 32.56
16.28 - 23.17
11.09 - 16.27
6.67 - 11.08
1.16 - 6.66
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


GOIÁS AND FEDERAL DISTRICT AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Santa Bárbara de Goiás
Vicentinópolis
Porteirão
Acreúna
Chapadão do Céu
S
0 50 100 150
Km
Percentage of establishments using agrotoxins in relation to the total of establishments in the municipality
(%)
29.83 - 82.35
22.13 - 29.82
15.98 - 22.12
11.28 - 15.97
6.94 - 11.27
1.55 - 6.93
Highlighted are the first five municipalities of the Federation Unit where the ratio between the number of establishments using agrotoxins and the total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

MATO GROSSO **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total of establishments in the municipality

(%)

- 37.12 - 92.71
- 26.40 - 37.11
- 17.47 - 26.39
- 11.27 - 17.46
- 6.42 - 11.26
- 1.16 - 6.41

0 90 180 270 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

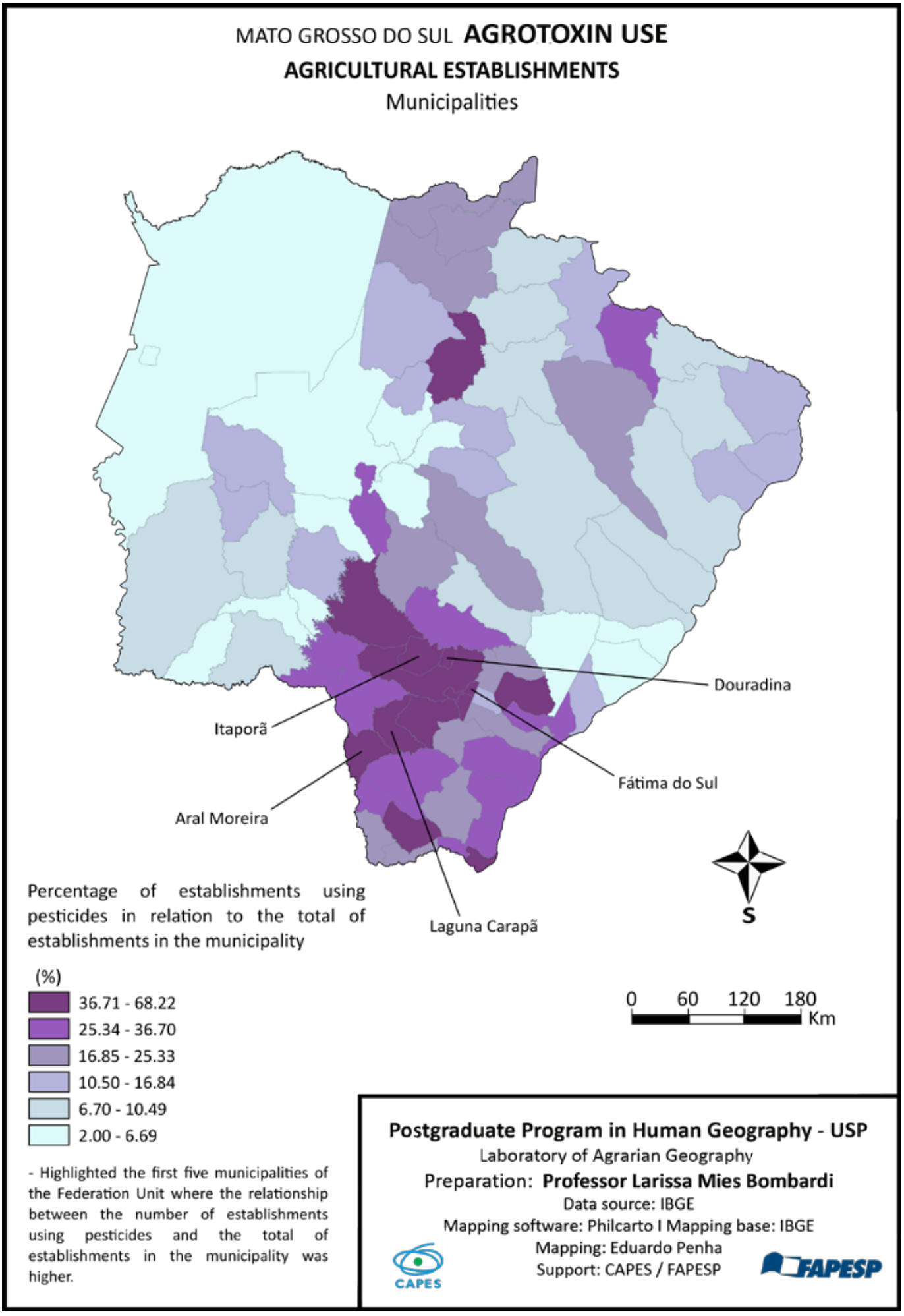
Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

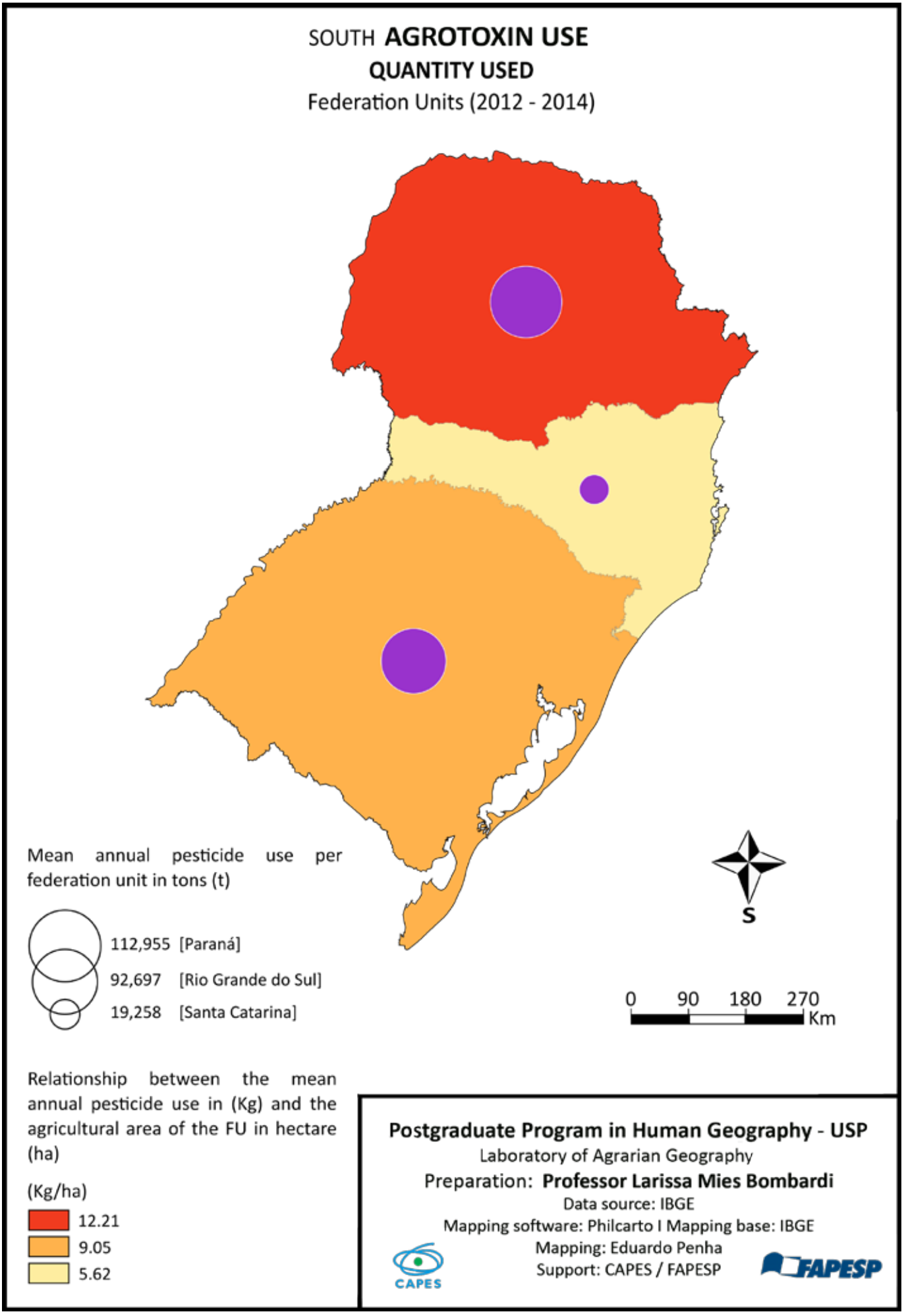
Mapping: Eduardo Penha

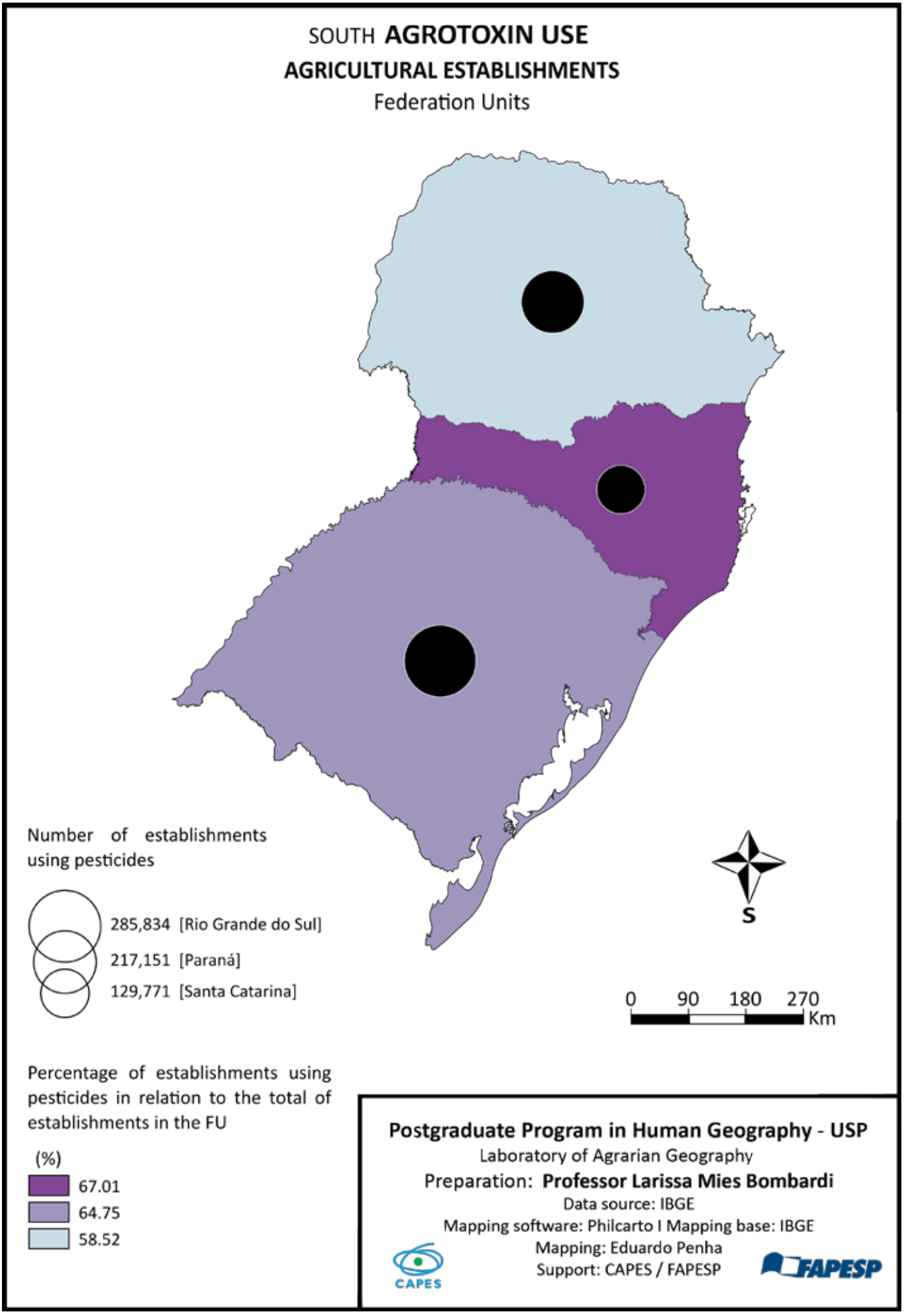
Support: CAPES / FAPESP

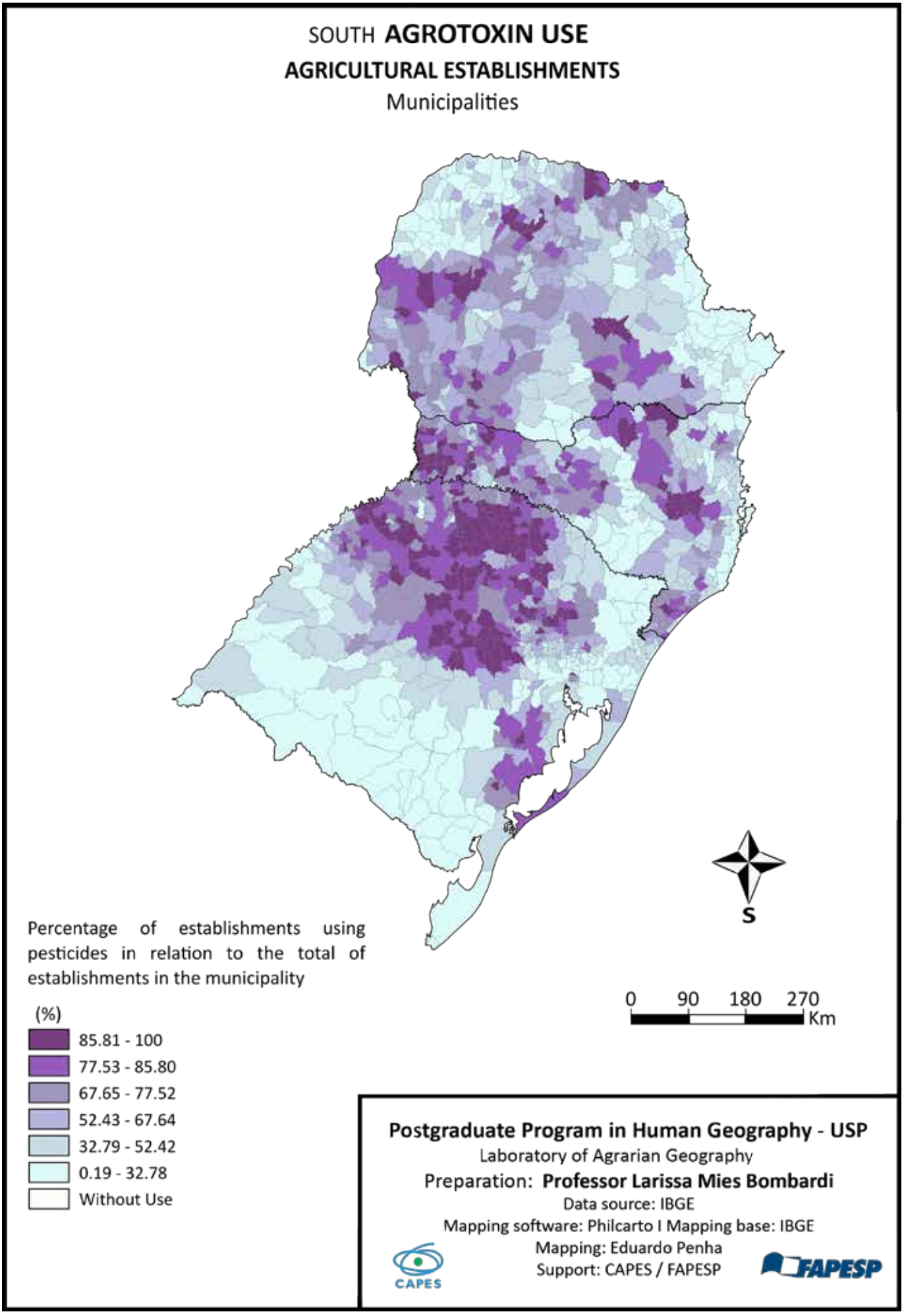
CAPES FAPESP


MATO GROSSO DO SUL AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Douradina
Itaporã
Fátima do Sul
Aral Moreira
Laguna Carapã
S
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
36.71 - 68.22
25.34 - 36.70
16.85 - 25.33
10.50 - 16.84
6.70 - 10.49
2.00 - 6.69
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.
0 60 120 180
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

SOUTH **AGROTOXIN USE**


SOUTH AGROTOXIN USE
QUANTITY USED
Federation Units (2012 - 2014)
Mean annual pesticide use per federation unit in tons (t)
112,955 [Paraná]
92,697 [Rio Grande do Sul]
19,258 [Santa Catarina]
S
0 90 180 270
Km
Relationship between the mean annual pesticide use in (Kg) and the agricultural area of the FU in hectare (ha)
(Kg/ha)
12.21
9.05
5.62
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

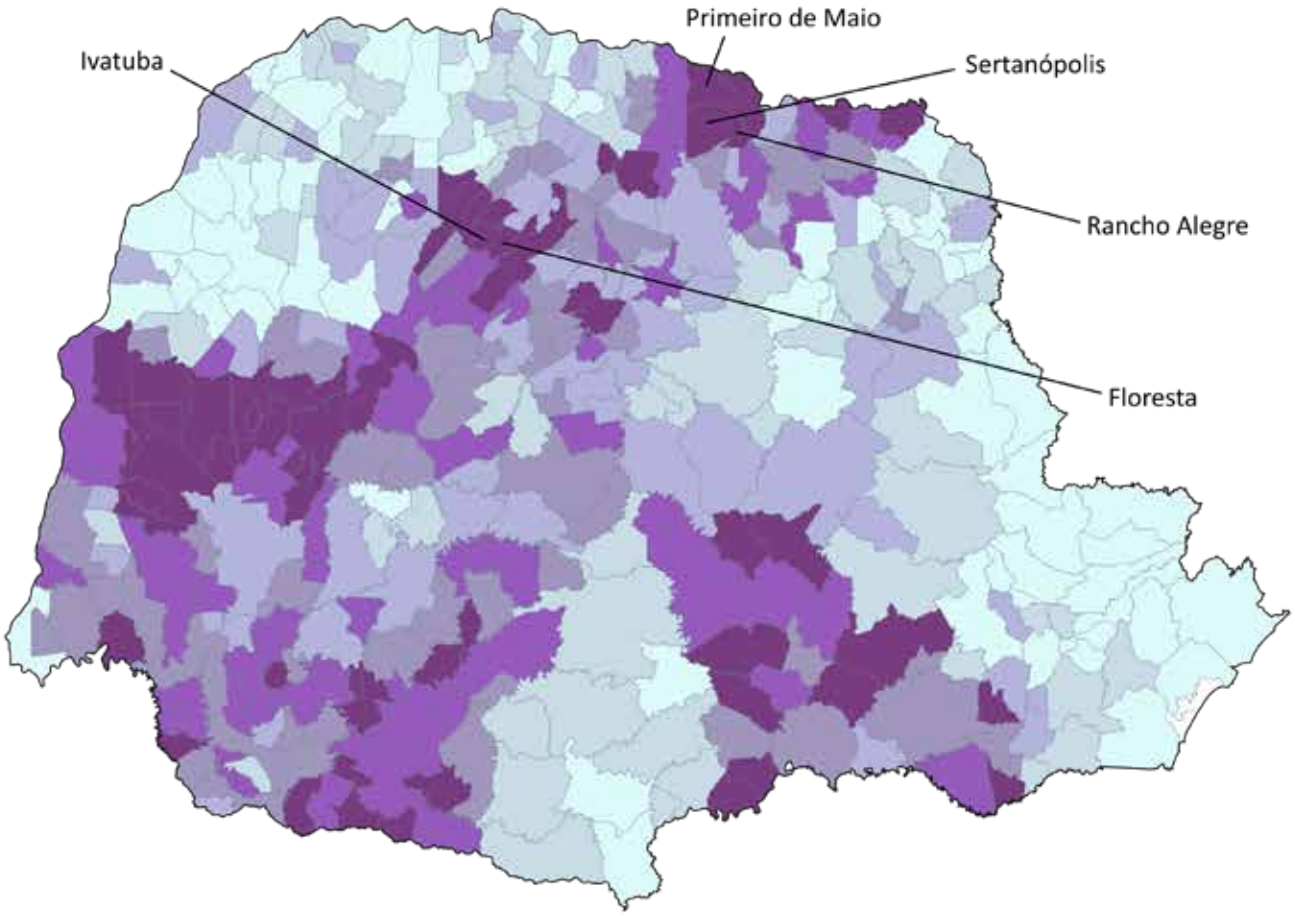

SOUTH AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Federation Units
Number of establishments using pesticides
285,834 [Rio Grande do Sul]
217,151 [Paraná]
129,771 [Santa Catarina]
S
0 90 180 270
Km
Percentage of establishments using pesticides in relation to the total of establishments in the FU
(%)
67.01
64.75
58.52
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


SOUTH AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
S
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
85.81 - 100
77.53 - 85.80
67.65 - 77.52
52.43 - 67.64
32.79 - 52.42
0.19 - 32.78
Without Use
0 90 180 270
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

PARANÁ **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total of establishments in the municipality

(%)

- 78.48 - 96.90
- 70.45 - 78.47
- 62.14 - 70.44
- 46.93 - 62.13
- 30.40 - 46.92
- 0.19 - 30.39
- Without Use

S

0 40 80 120 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

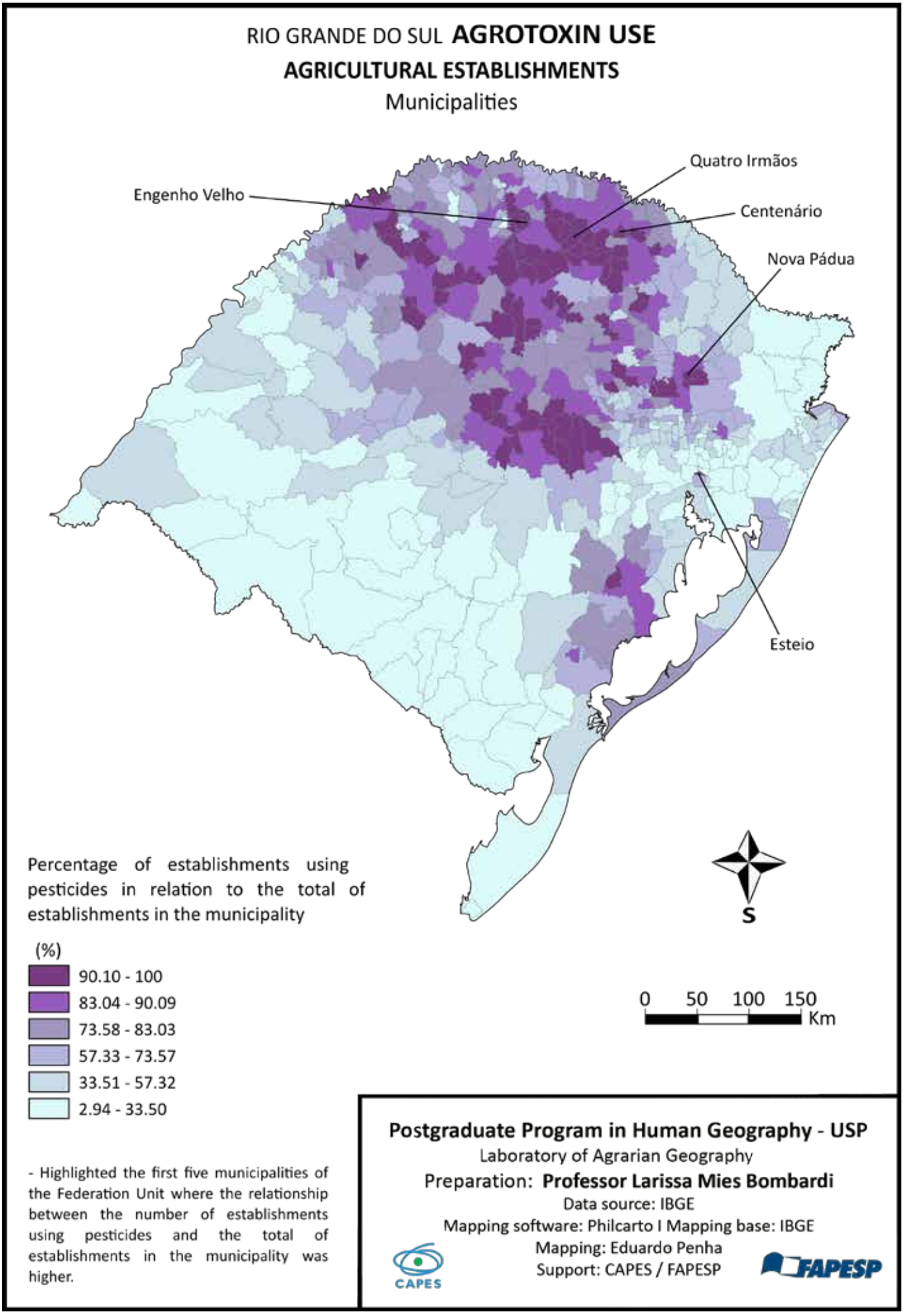
Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

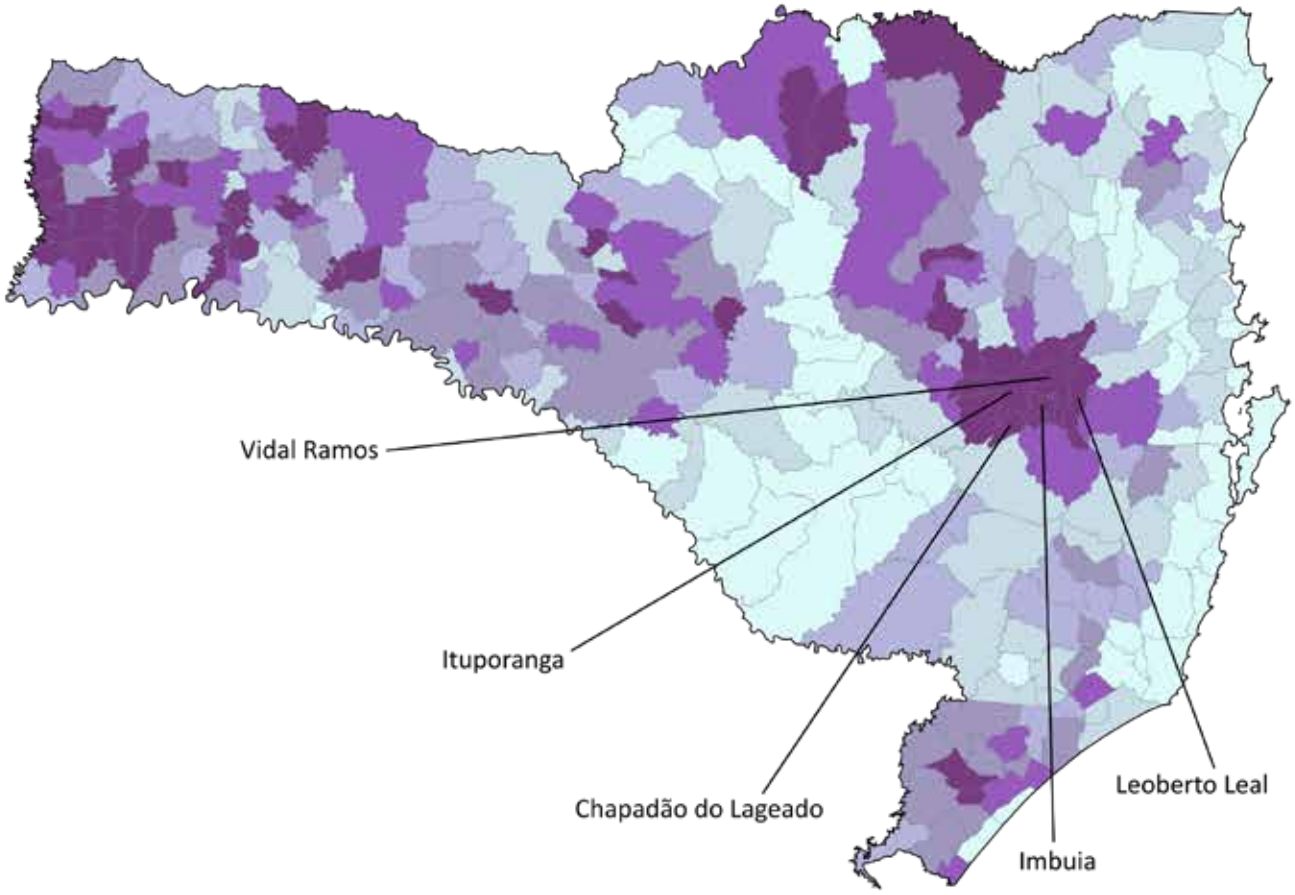
Mapping: Eduardo Penha

Support: CAPES / FAPESP

CAPES FAPESP


RIO GRANDE DO SUL AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Quatro Irmãos
Engenho Velho
Centenário
Nova Pádua
Esteio
S
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
90.10 - 100
83.04 - 90.09
73.58 - 83.03
57.33 - 73.57
33.51 - 57.32
2.94 - 33.50
0 50 100 150
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

SANTA CATARINA **AGROTOXIN USE**
AGRICULTURAL ESTABLISHMENTS
Municipalities



Percentage of establishments using pesticides in relation to the total of establishments in the municipality

(%)
- 85.29 - 97.63
- 78.97 - 85.28
- 69.67 - 78.96
- 57.50 - 69.66
- 38.48 - 57.49
- 0.49 - 38.47
- Without Use

S

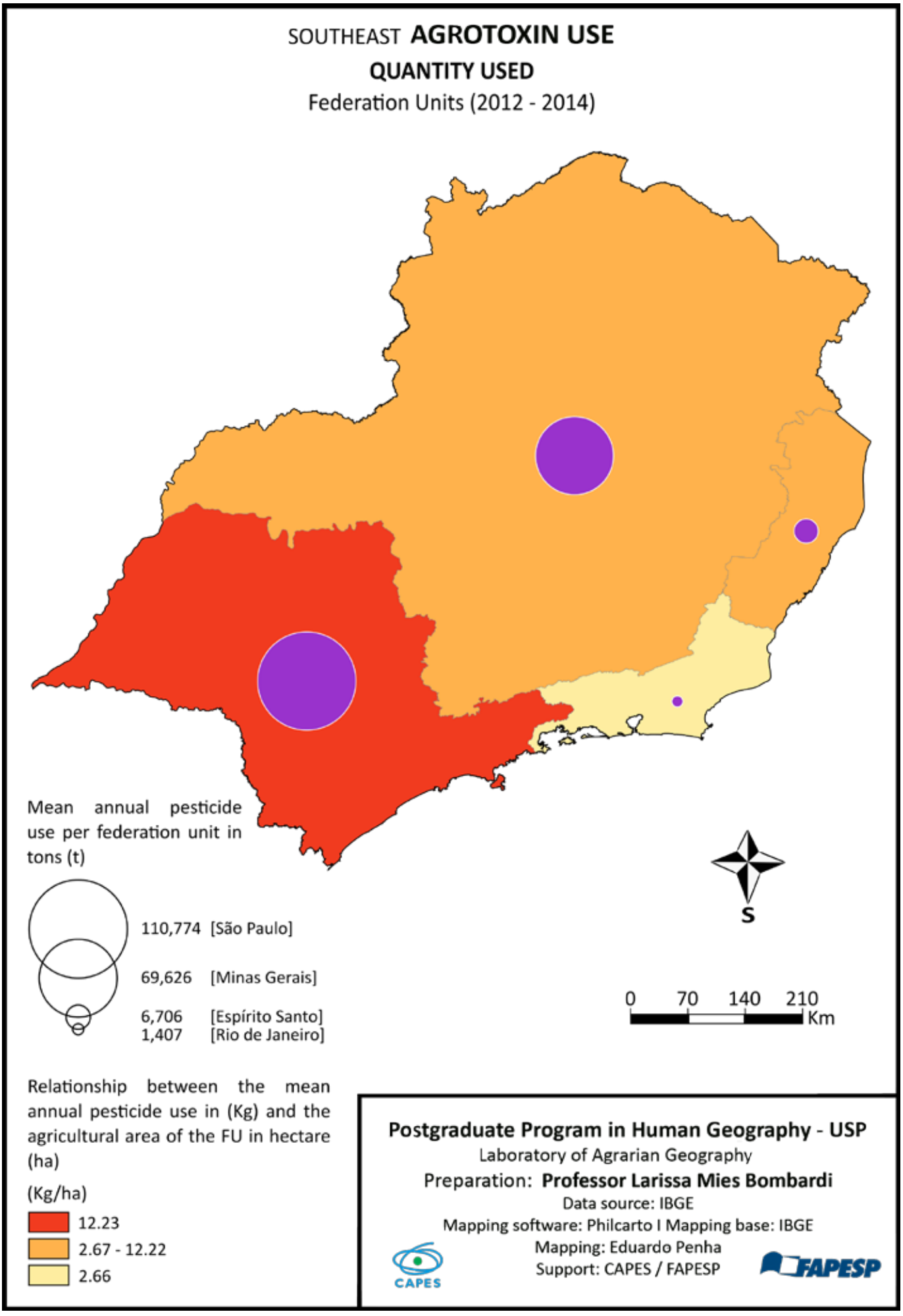
0 35 70 105 Km

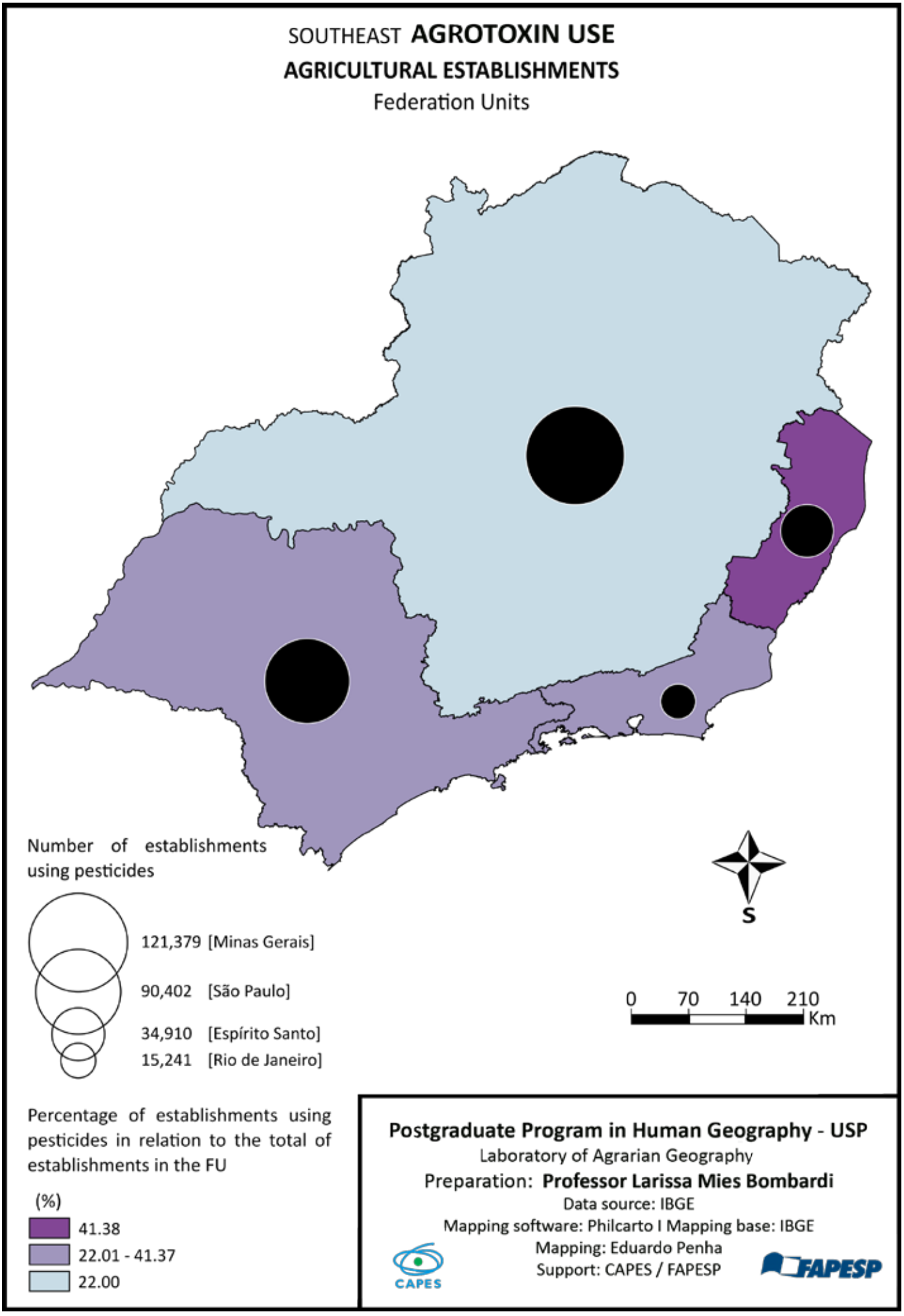
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

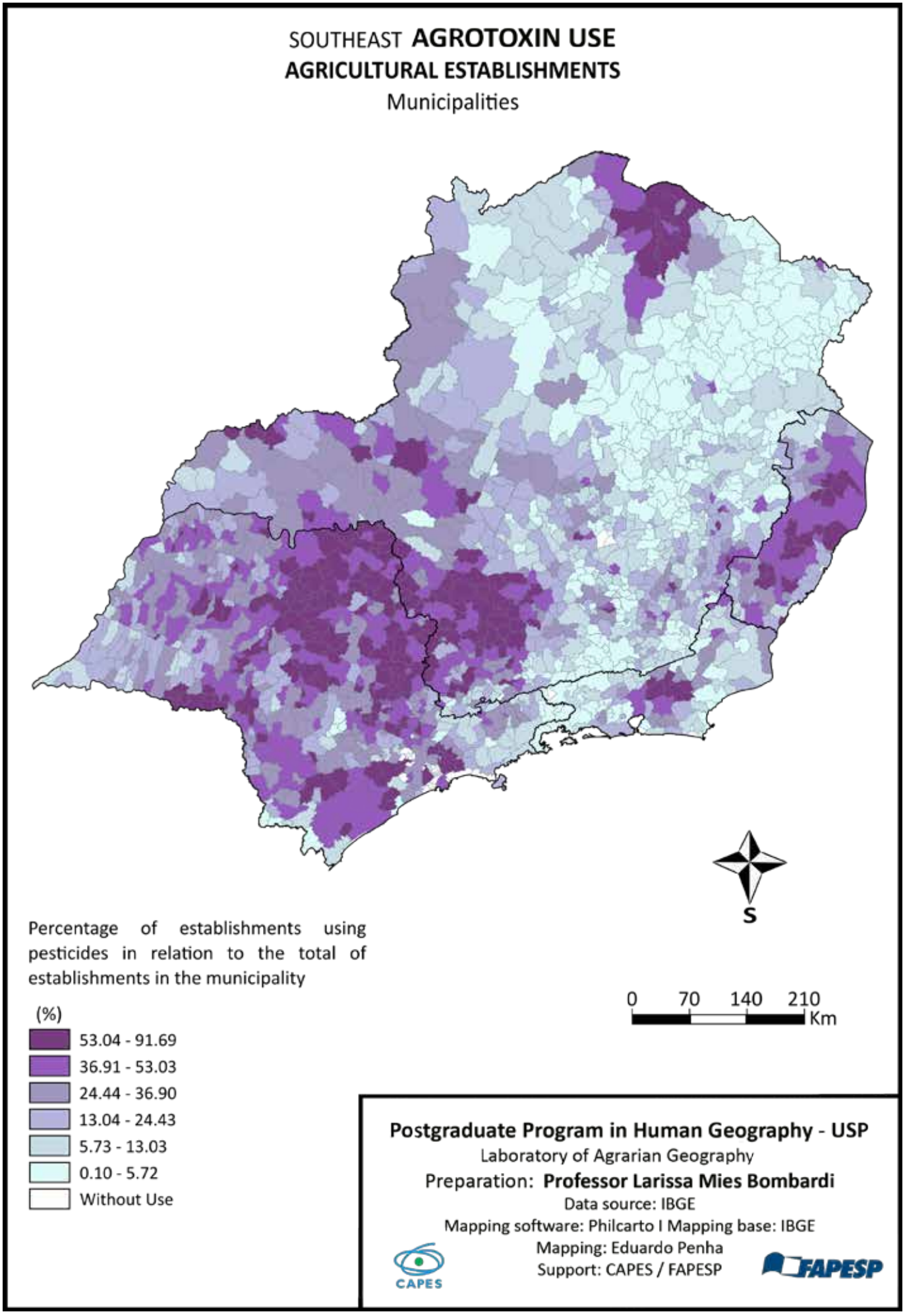
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

CAPES FAPESP

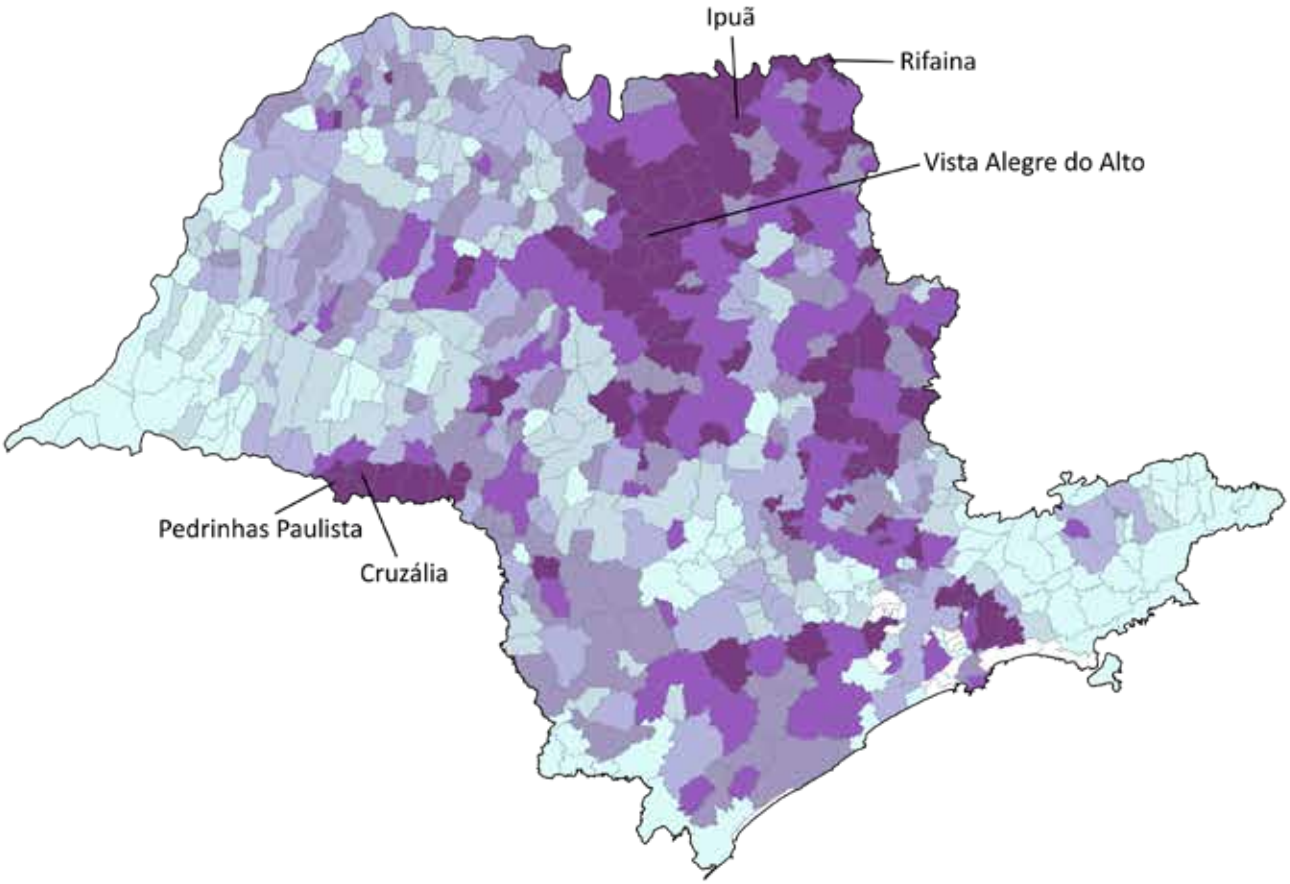
SOUTHEAST **AGROTOXIN USE**


SOUTHEAST AGROTOXIN USE
QUANTITY USED
Federation Units (2012 - 2014)
Mean annual pesticide use per federation unit in tons (t)
110,774 [São Paulo]
69,626 [Minas Gerais]
6,706 [Espírito Santo]
1,407 [Rio de Janeiro]
S
0 70 140 210
Km
Relationship between the mean annual pesticide use in (Kg) and the agricultural area of the FU in hectare (ha)
(Kg/ha)
12.23
2.67 - 12.22
2.66
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


SOUTHEAST AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Federation Units
Number of establishments using pesticides
121,379 [Minas Gerais]
90,402 [São Paulo]
34,910 [Espírito Santo]
15,241 [Rio de Janeiro]
S
0 70 140 210
Km
Percentage of establishments using pesticides in relation to the total of establishments in the FU
(%)
41.38
22.01 - 41.37
22.00
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


SOUTHEAST AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
S
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
53.04 - 91.69
36.91 - 53.03
24.44 - 36.90
13.04 - 24.43
5.73 - 13.03
0.10 - 5.72
Without Use
0 70 140 210
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

SÃO PAULO **AGROTOXIN USE**
AGRICULTURAL ESTABLISHMENTS
Municipalities



Percentage of establishments using pesticides in relation to the total of establishments in the municipality

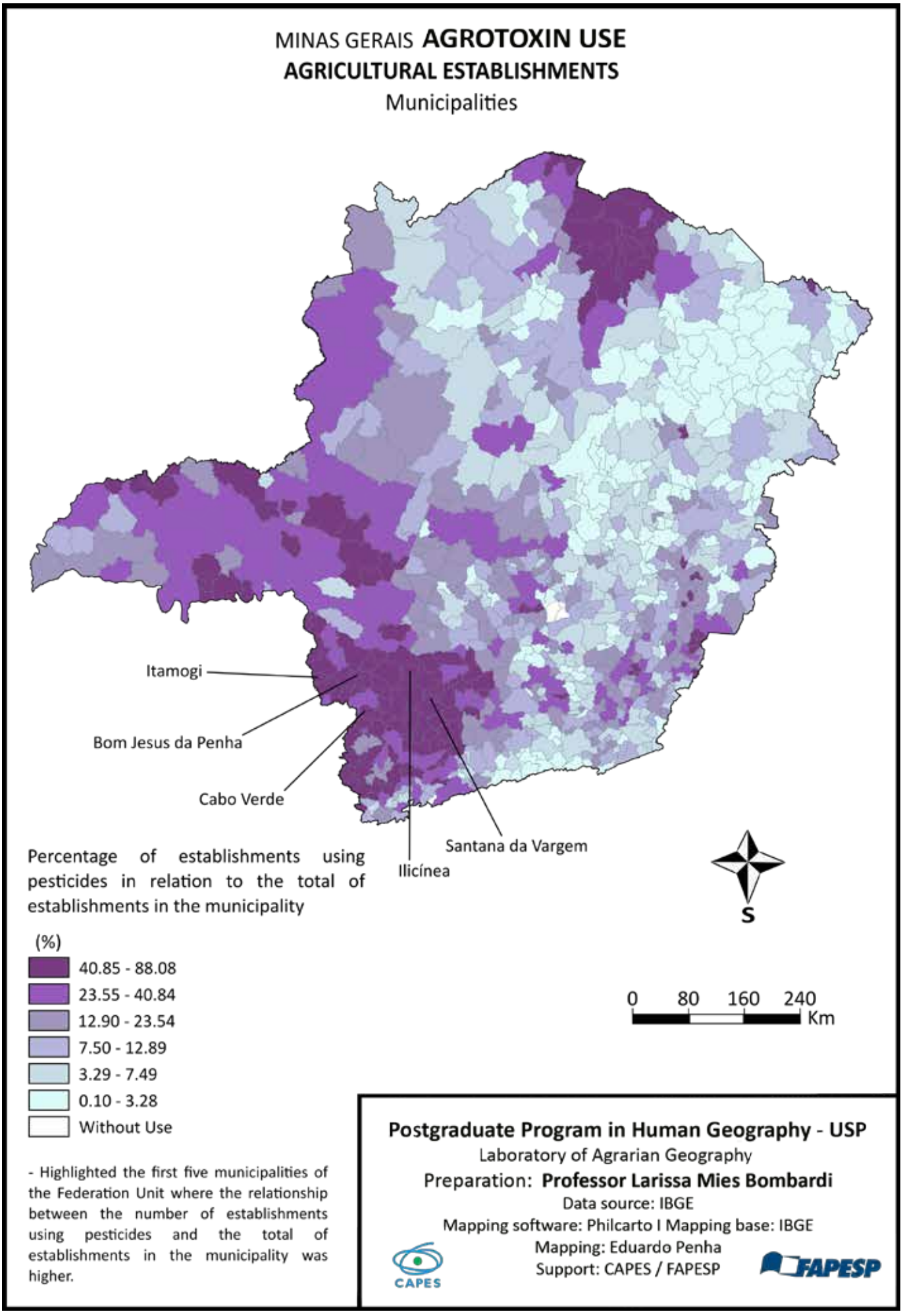
(%)
- 61.17 - 91.16
- 48.10 - 61.16
- 38.11 - 48.09
- 30.08 - 38.10
- 19.70 - 30.07
- 1.75 - 19.69
- Without Use

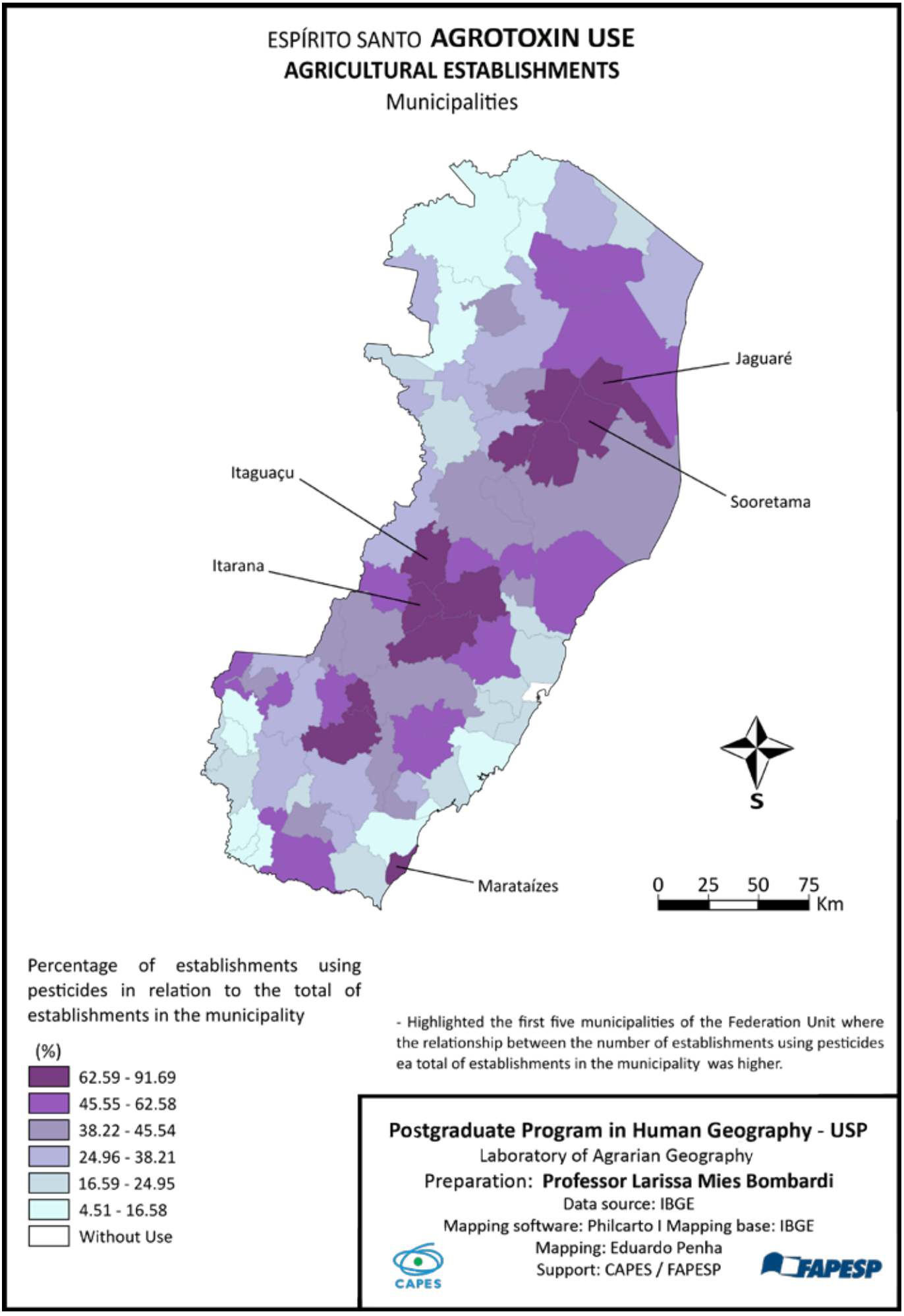
S

0 60 120 180 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

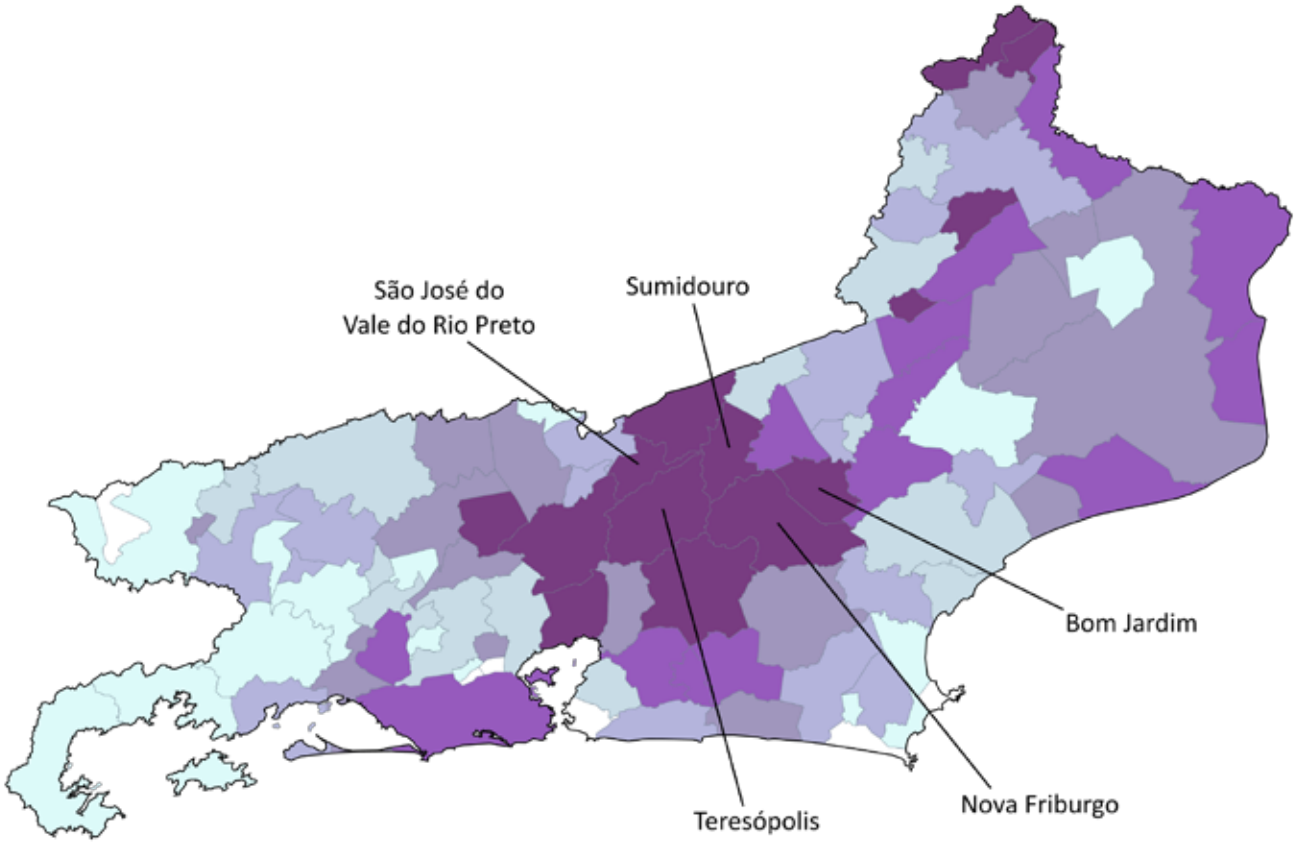

MINAS GERAIS AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Itamogi
Bom Jesus da Penha
Cabo Verde
Ilicínea
Santana da Vargem
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
40.85 - 88.08
23.55 - 40.84
12.90 - 23.54
7.50 - 12.89
3.29 - 7.49
0.10 - 3.28
Without Use
S
0 80 160 240
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


ESPÍRITO SANTO AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Jaguaré
Sooretama
Itaguaçu
Itarana
Marataízes
S
0 25 50 75
Km
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
62.59 - 91.69
45.55 - 62.58
38.22 - 45.54
24.96 - 38.21
16.59 - 24.95
4.51 - 16.58
Without Use
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides ea total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

RIO DE JANEIRO **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total of establishments in the municipality

(%)

- 33.09 - 81.26
- 20.17 - 33.08
- 11.21 - 20.16
- 5.83 - 11.20
- 3.73 - 5.82
- 0.30 - 3.72
- Without Use

S

0 25 50 75 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

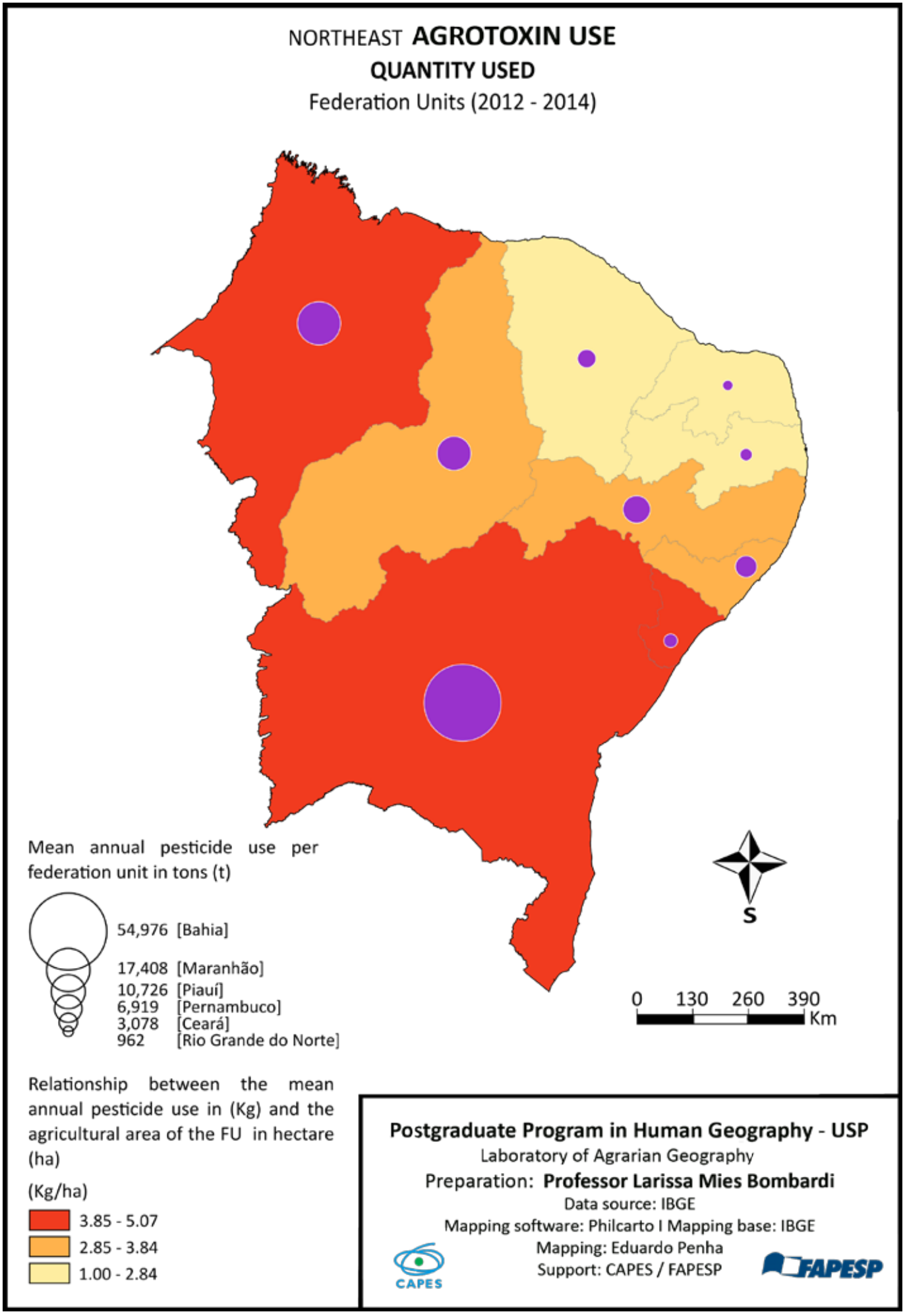
Data source: IBGE

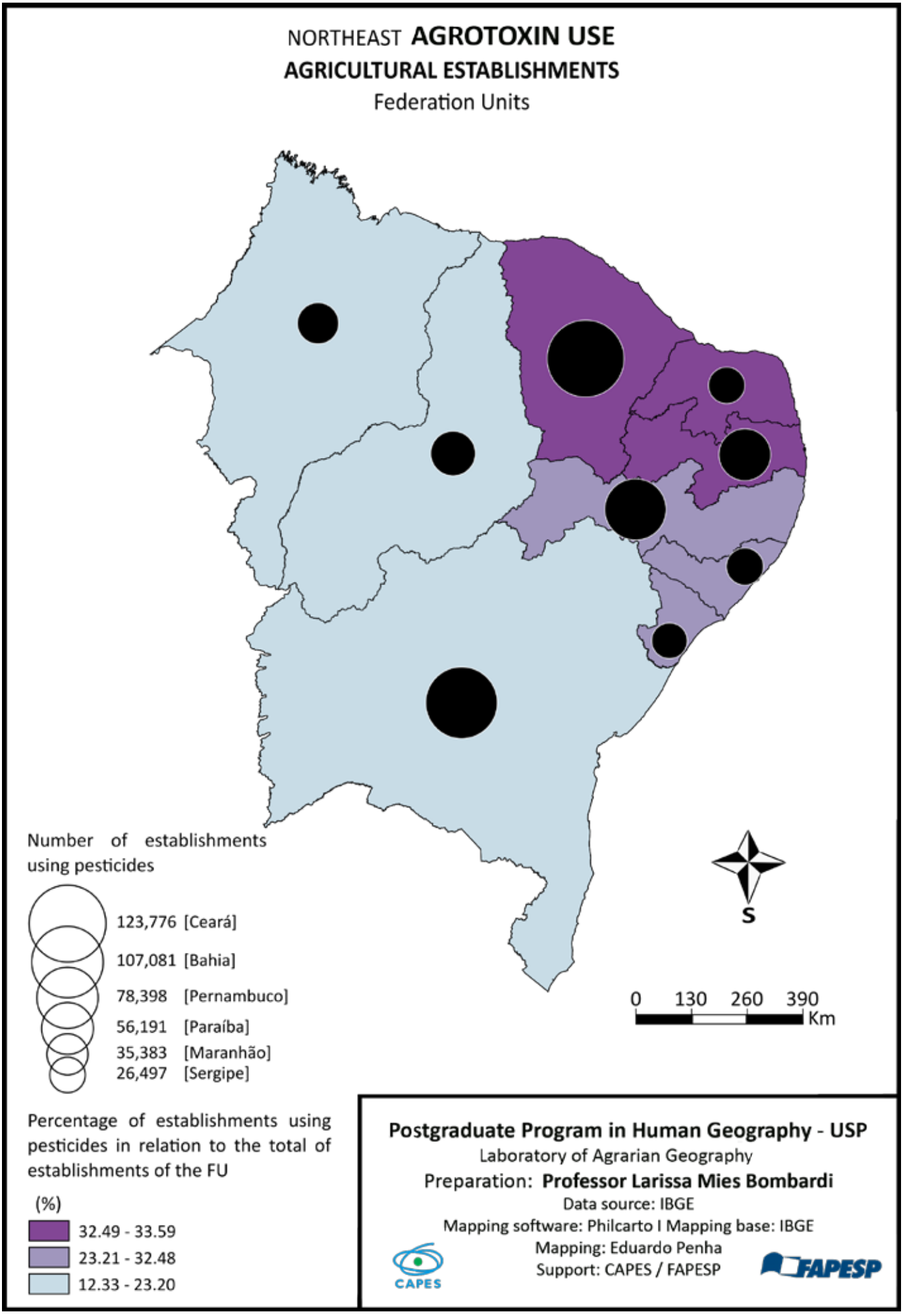
Mapping software: Philcarto I Mapping base: IBGE

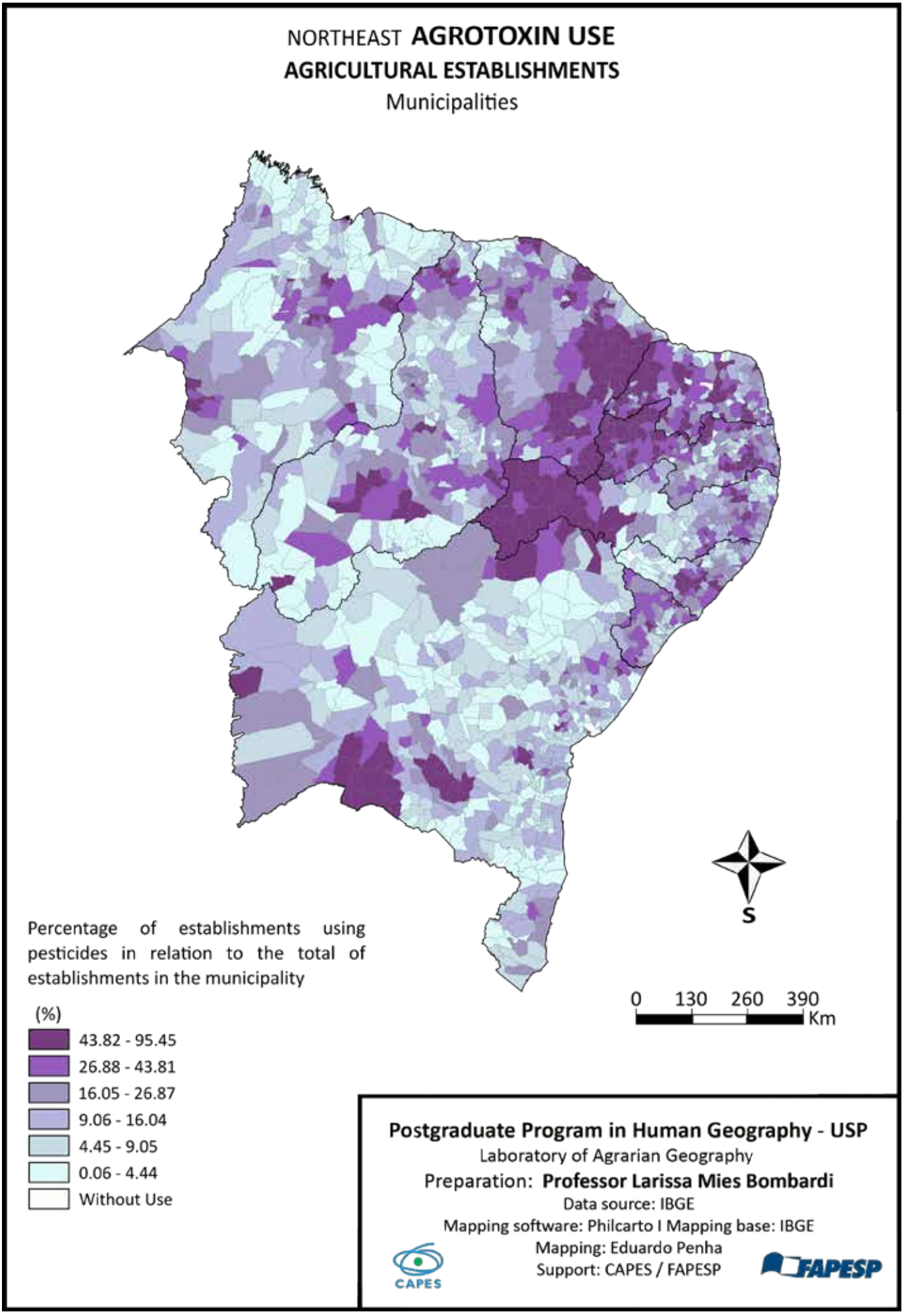
Mapping: Eduardo Penha

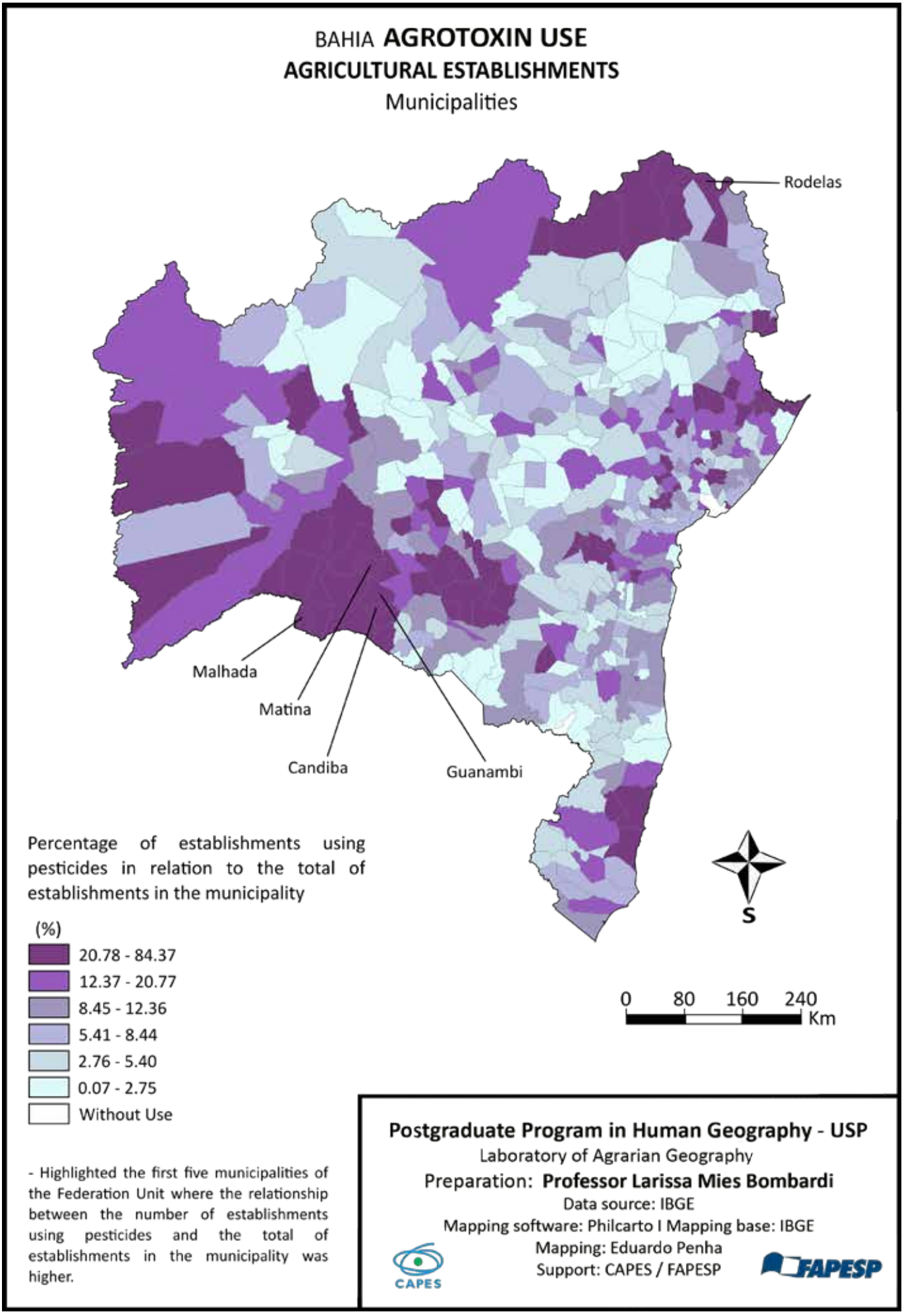
Support: CAPES / FAPESP

NORTHEAST **AGROTOXIN USE**


NORTHEAST AGROTOXIN USE
QUANTITY USED
Federation Units (2012 - 2014)
Mean annual pesticide use per federation unit in tons (t)
54,976 [Bahia]
17,408 [Maranhão]
10,726 [Piauí]
6,919 [Pernambuco]
3,078 [Ceará]
962 [Rio Grande do Norte]
S
0 130 260 390
Km
Relationship between the mean annual pesticide use in (Kg) and the agricultural area of the FU in hectare (ha)
(Kg/ha)
3.85 - 5.07
2.85 - 3.84
1.00 - 2.84
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


NORTHEAST AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Federation Units
Number of establishments using pesticides
123,776 [Ceará]
107,081 [Bahia]
78,398 [Pernambuco]
56,191 [Paraíba]
35,383 [Maranhão]
26,497 [Sergipe]
S
0 130 260 390
Km
Percentage of establishments using pesticides in relation to the total of establishments of the FU
(%)
32.49 - 33.59
23.21 - 32.48
12.33 - 23.20
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

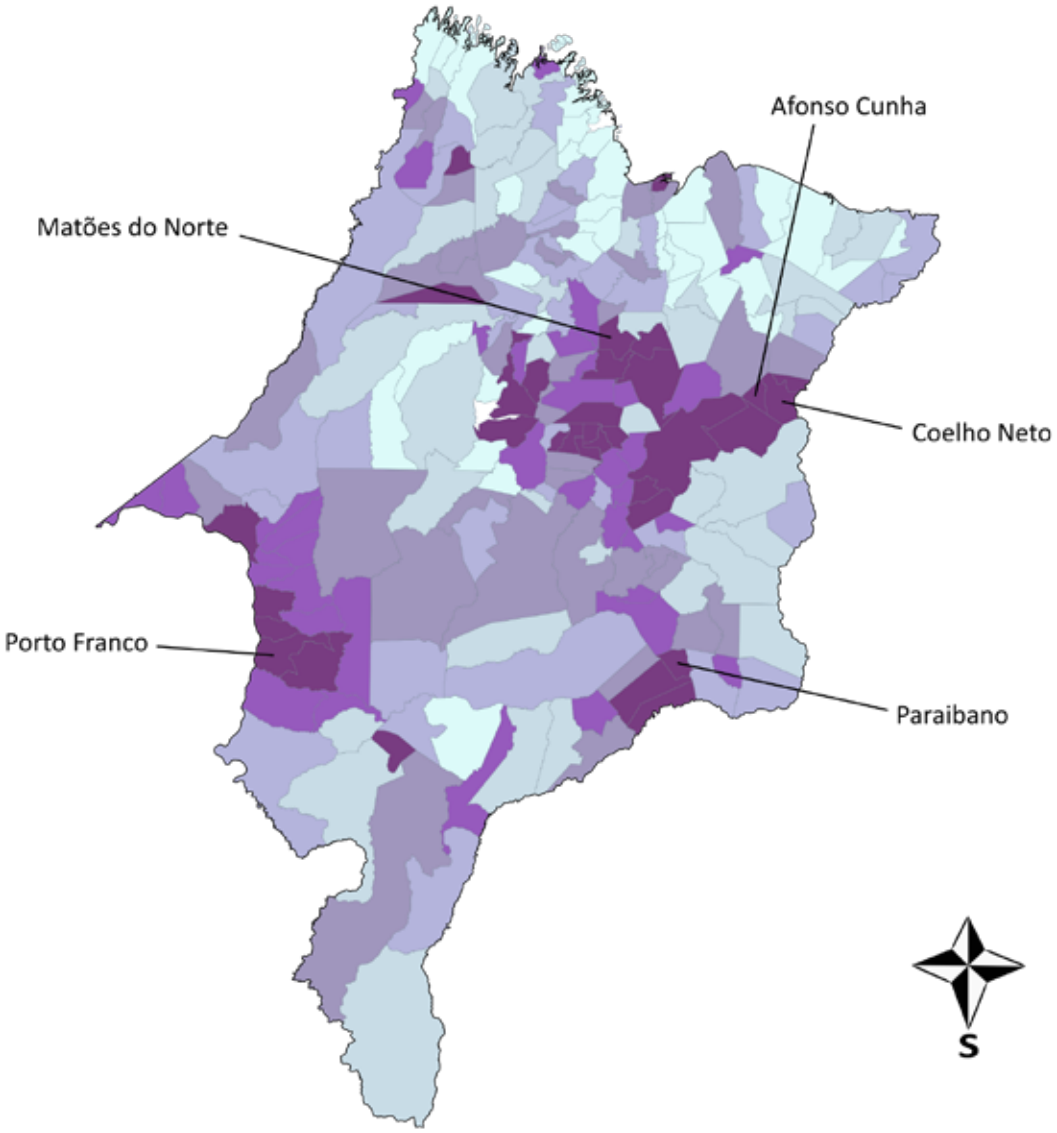

NORTHEAST AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
43.82 - 95.45
26.88 - 43.81
16.05 - 26.87
9.06 - 16.04
4.45 - 9.05
0.06 - 4.44
Without Use
S
0 130 260 390
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BAHIA AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Rodelas
Malhada
Matina
Candiba
Guanambi
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
20.78 - 84.37
12.37 - 20.77
8.45 - 12.36
5.41 - 8.44
2.76 - 5.40
0.07 - 2.75
Without Use
S
0 80 160 240
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

MARANHÃO **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total of establishments in the municipality

(%)

- 28.01 - 75.54
- 18.37 - 28.00
- 10.58 - 18.36
- 5.19 - 10.57
- 2.19 - 5.18
- 0.06 - 2.18
- Without Use

- Highlighted the 5 first municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

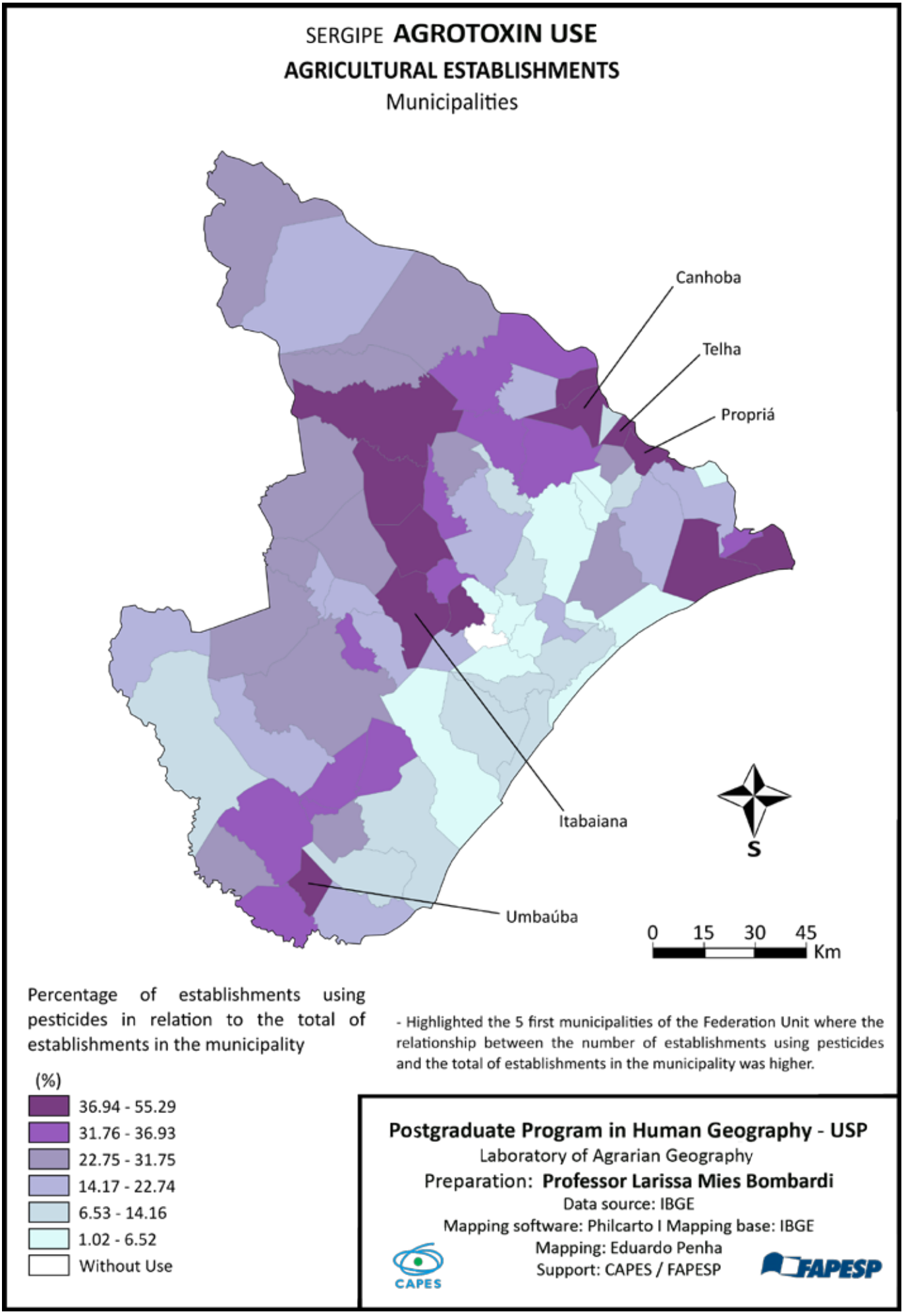
Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

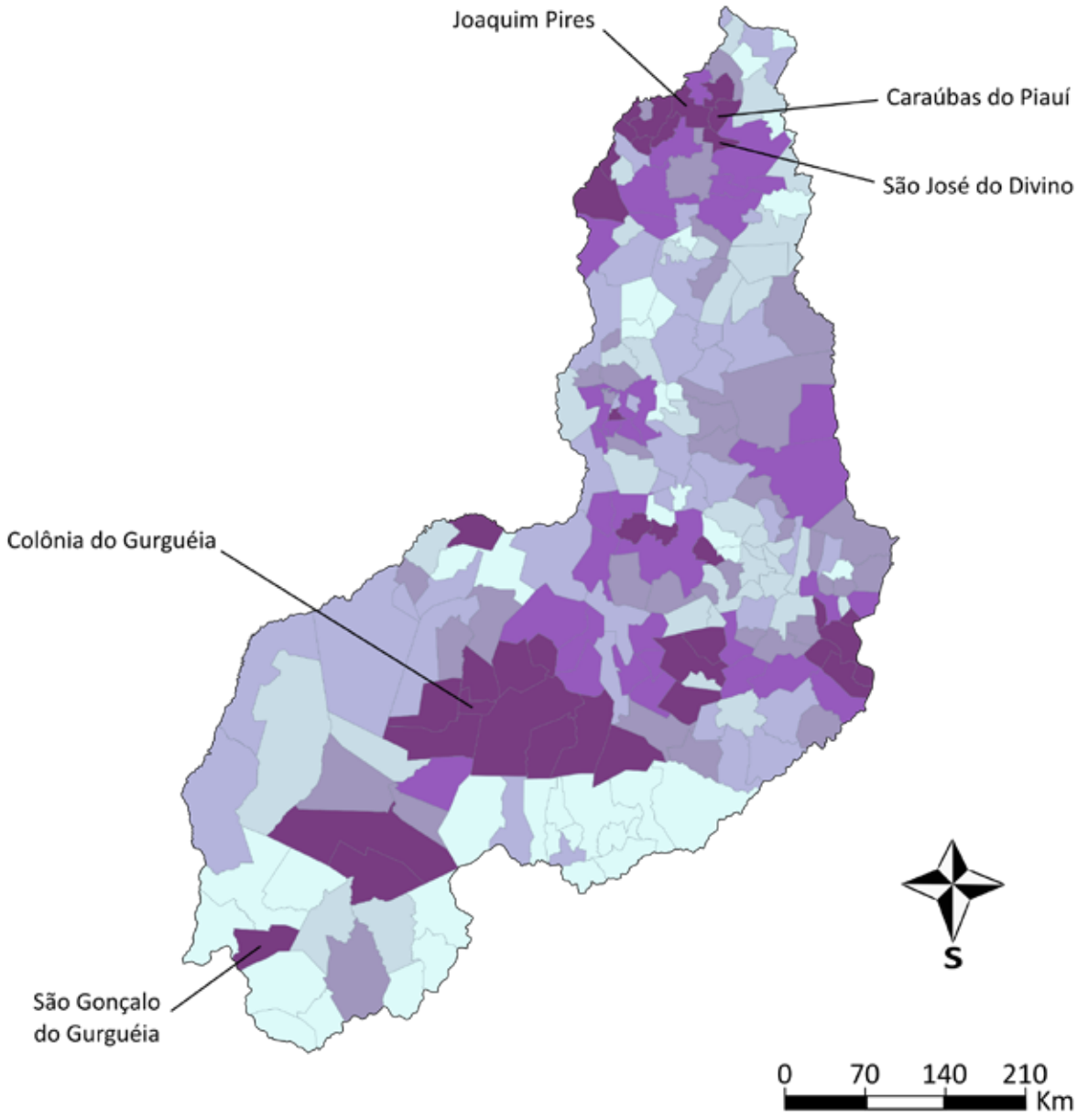
Support: CAPES / FAPESP


SERGIPE AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Canhoba
Telha
Propriá
Itabaiana
Umbaúba
S
0 15 30 45
Km
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
36.94 - 55.29
31.76 - 36.93
22.75 - 31.75
14.17 - 22.74
6.53 - 14.16
1.02 - 6.52
Without Use
- Highlighted the 5 first municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

PIAUÍ **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total of establishments in the municipality

(%)

- 33.47 - 86.78
- 20.41 - 33.46
- 14.45 - 20.40
- 7.84 - 14.44
- 3.37 - 7.83
- 0.20 - 3.36

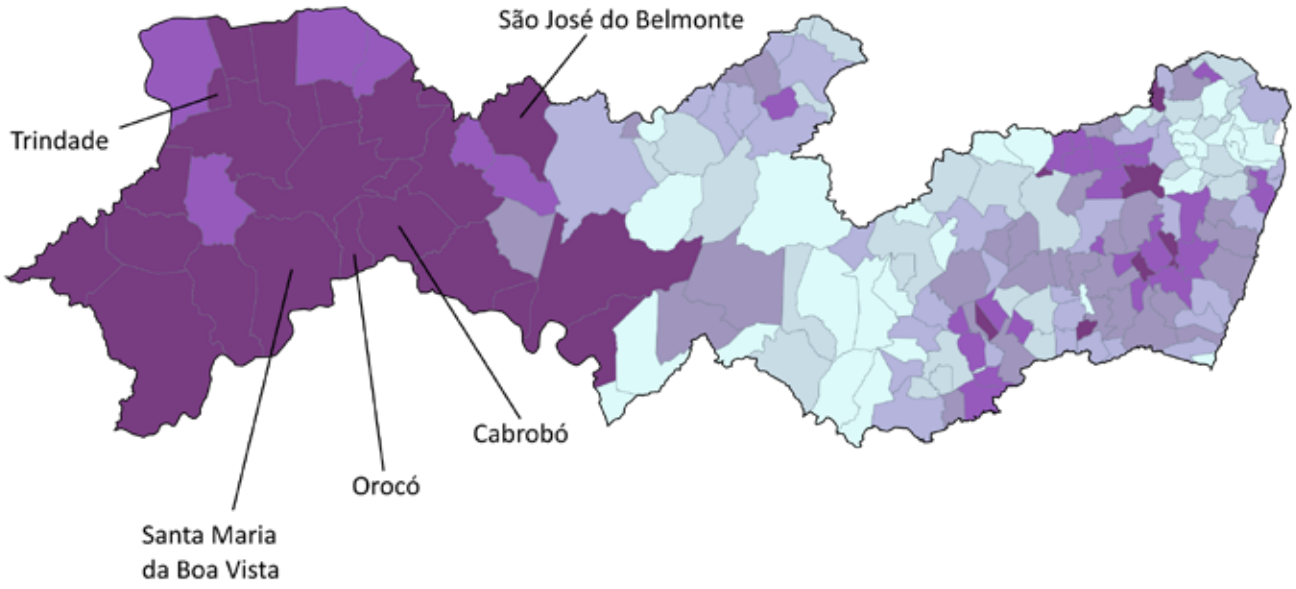
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

PERNAMBUCO **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total establishments in the of establishments in the municipality

(%)

- 46.23 - 75.87
- 30.19 - 46.22
- 16.18 - 30.18
- 10.30 - 16.17
- 6.34 - 10.29
- 0.46 - 6.33
- Without Use

S

0 50 100 150 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

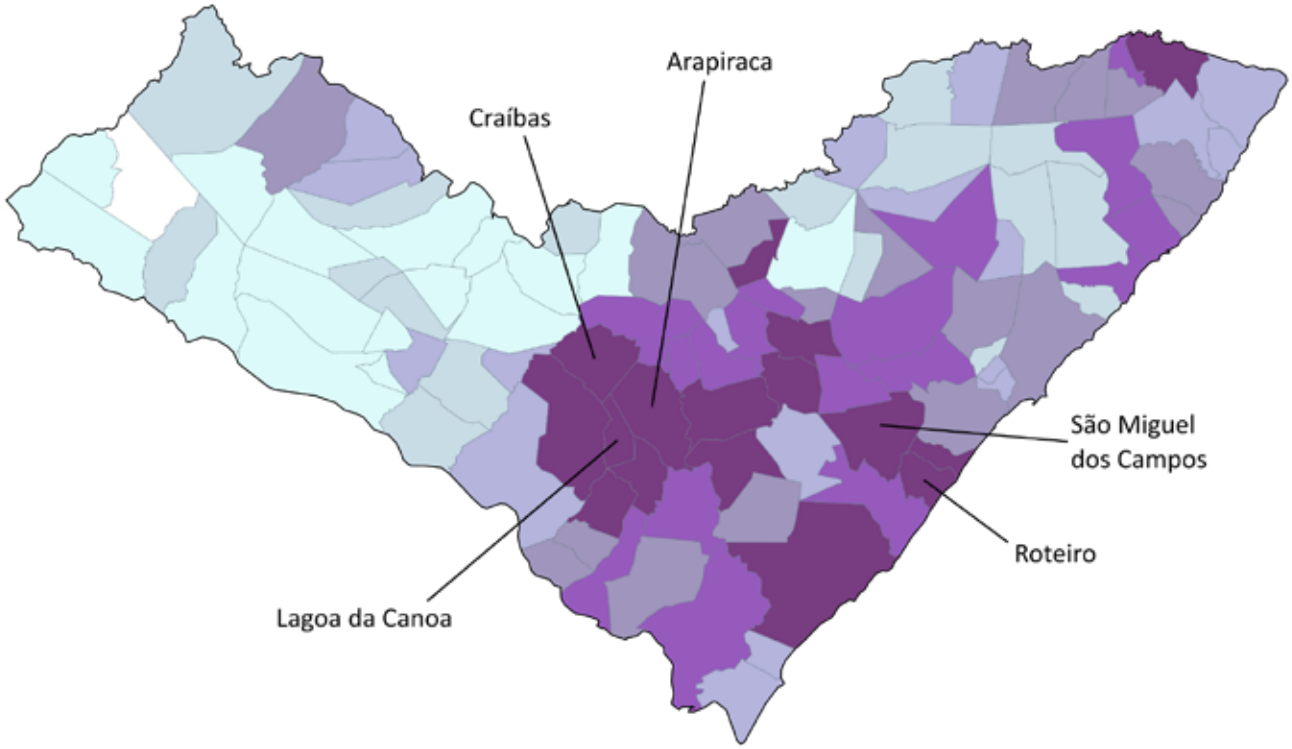
Mapping: Eduardo Penha

Support: CAPES / FAPESP

ALAGOAS **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total of establishments of the municipality

(%)

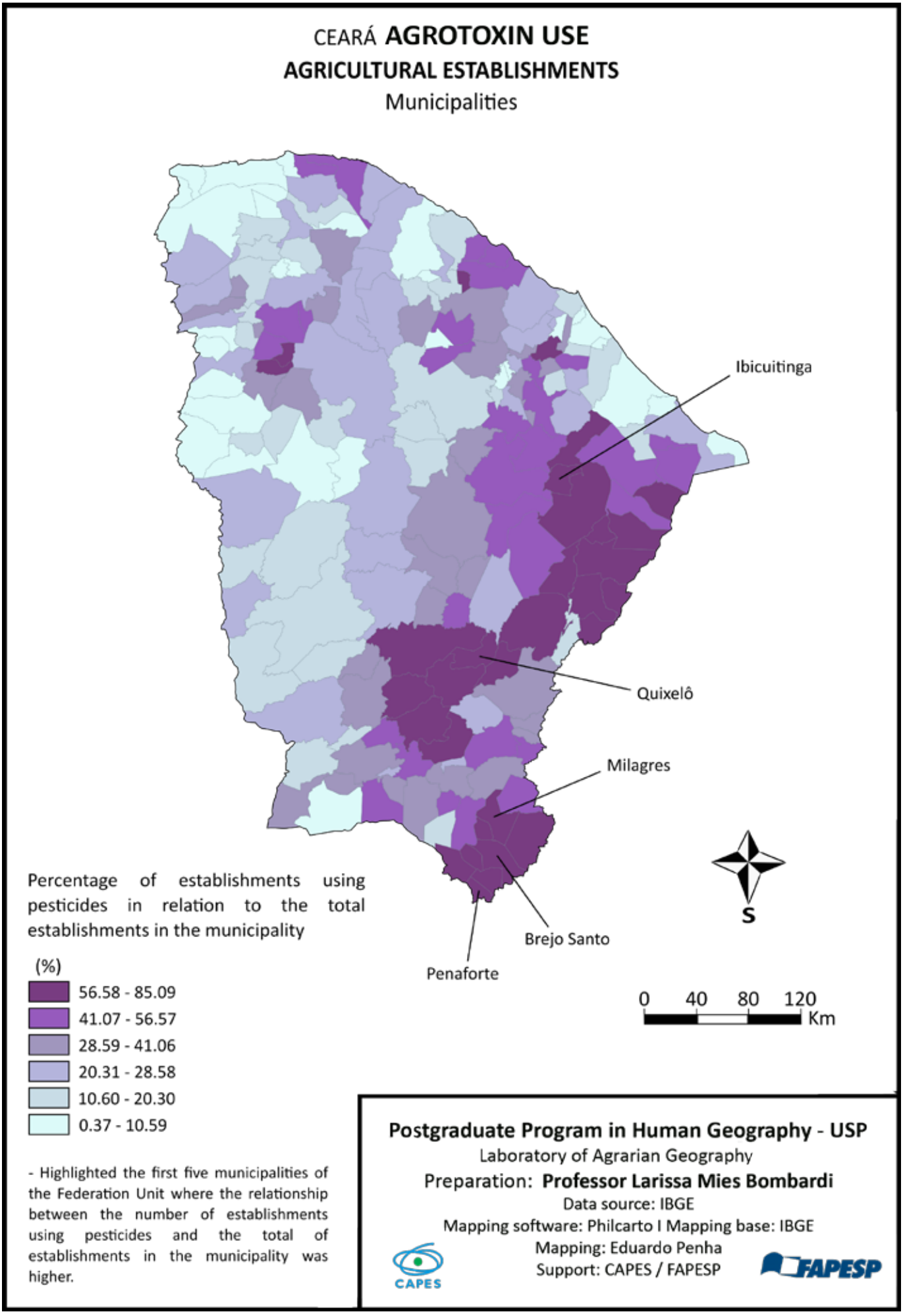
- 42.84 - 95.45
- 23.29 - 42.83
- 14.78 - 23.28
- 8.26 - 14.77
- 4.59 - 8.25
- 0.27 - 4.58
- Without Use

S

0 20 40 60 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

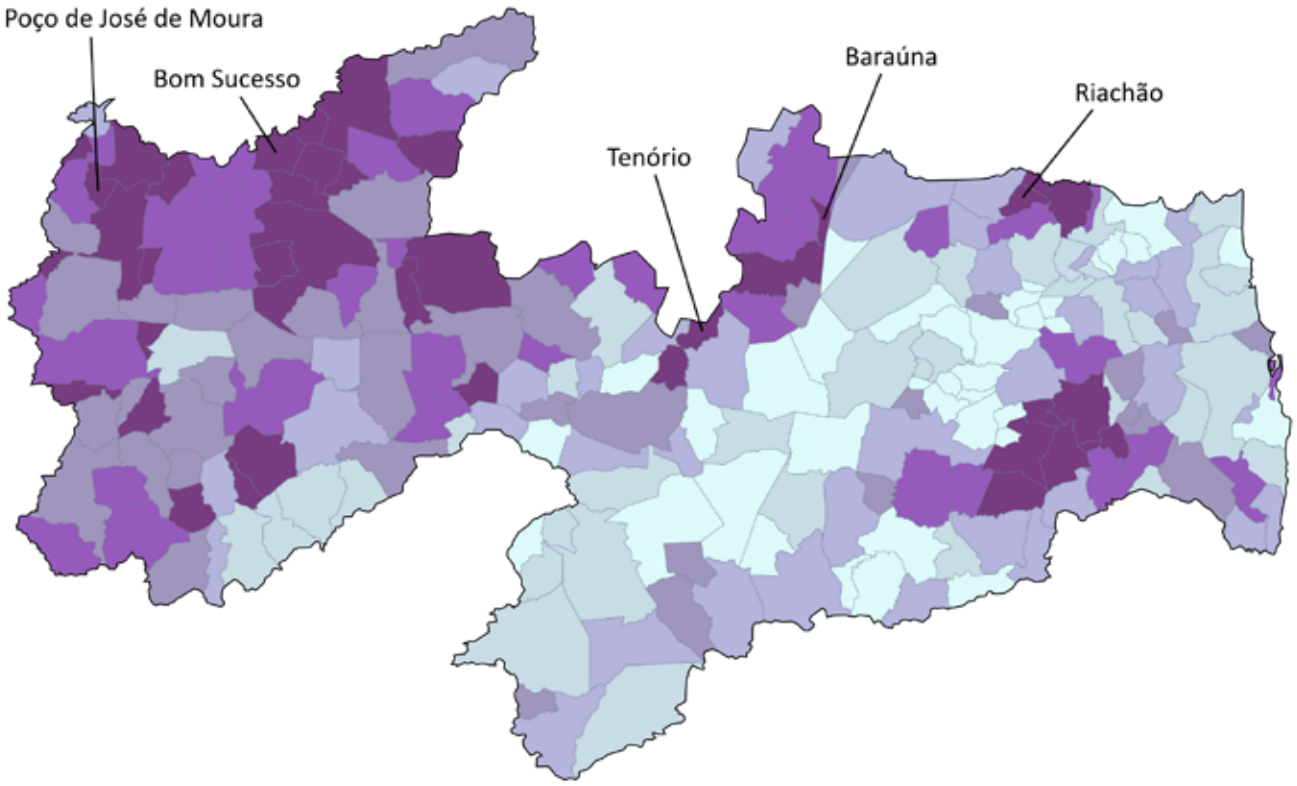
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP


CEARÁ AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Ibicuitinga
Quixelô
Milagres
Brejo Santo
Penaforte
S
0 40 80 120
Km
Percentage of establishments using pesticides in relation to the total establishments in the municipality
(%)
56.58 - 85.09
41.07 - 56.57
28.59 - 41.06
20.31 - 28.58
10.60 - 20.30
0.37 - 10.59
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

PARAÍBA **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total of establishments in the municipality

(%)

- 61.22 - 93.30
- 45.96 - 61.21
- 34.88 - 45.95
- 23.42 - 34.87
- 13.07 - 23.41
- 0.86 - 13.06

S

0 30 60 90 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

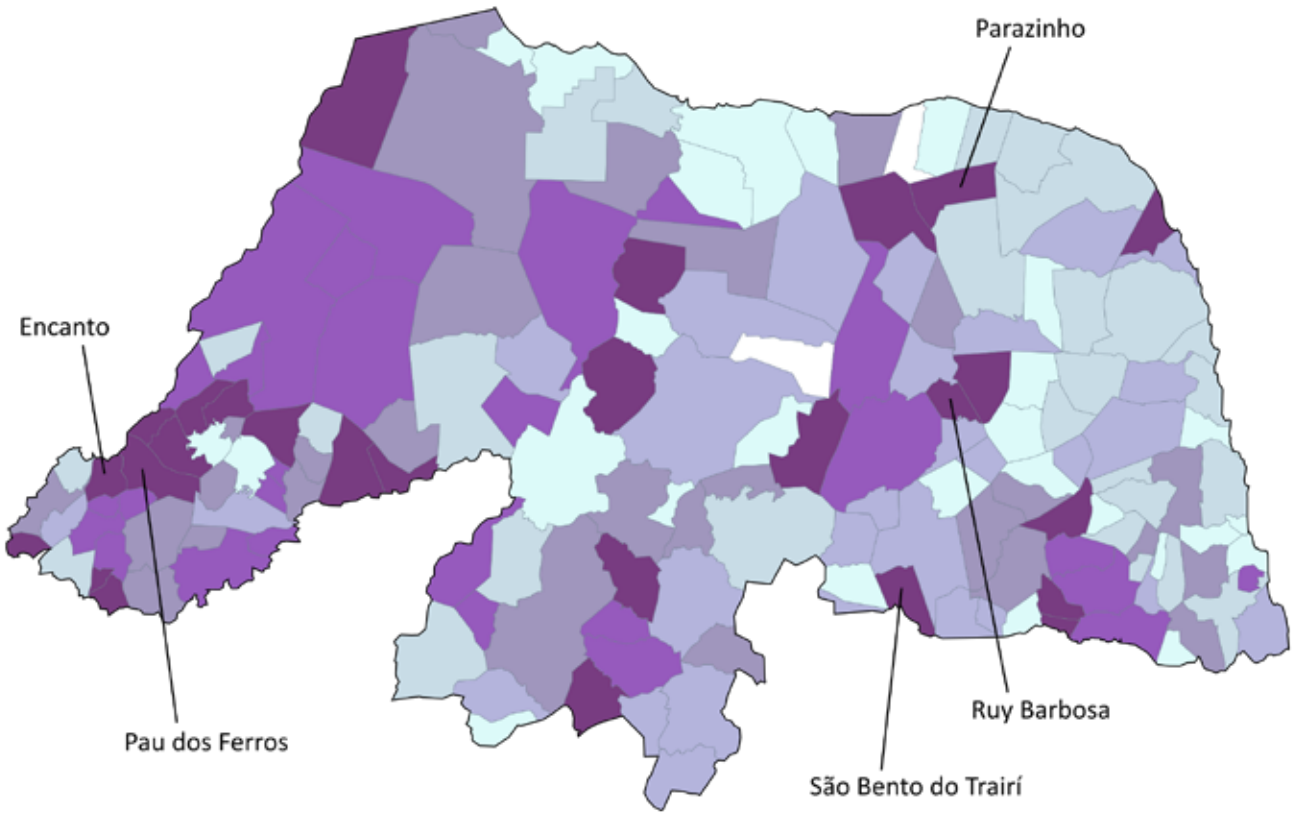
Mapping: Eduardo Penha

Support: CAPES / FAPESP

RIO GRANDE DO NORTE **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total of establishments of the municipality

(%)

- 54.56 - 88.74
- 43.97 - 54.55
- 32.97 - 43.96
- 18.20 - 32.96
- 11.15 - 18.19
- 0.58 - 11.14
- Without Use

S

0 25 50 75 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

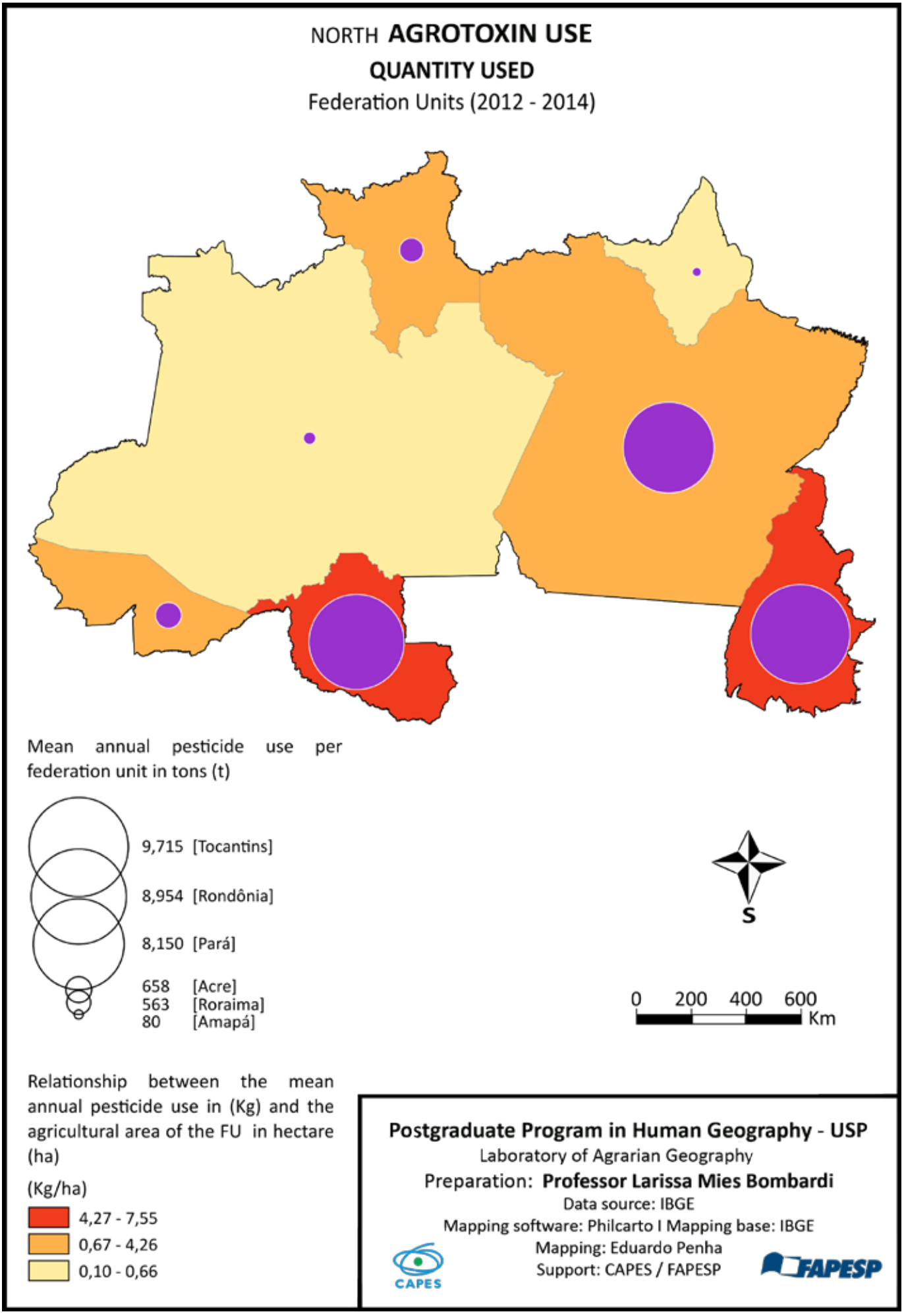
Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

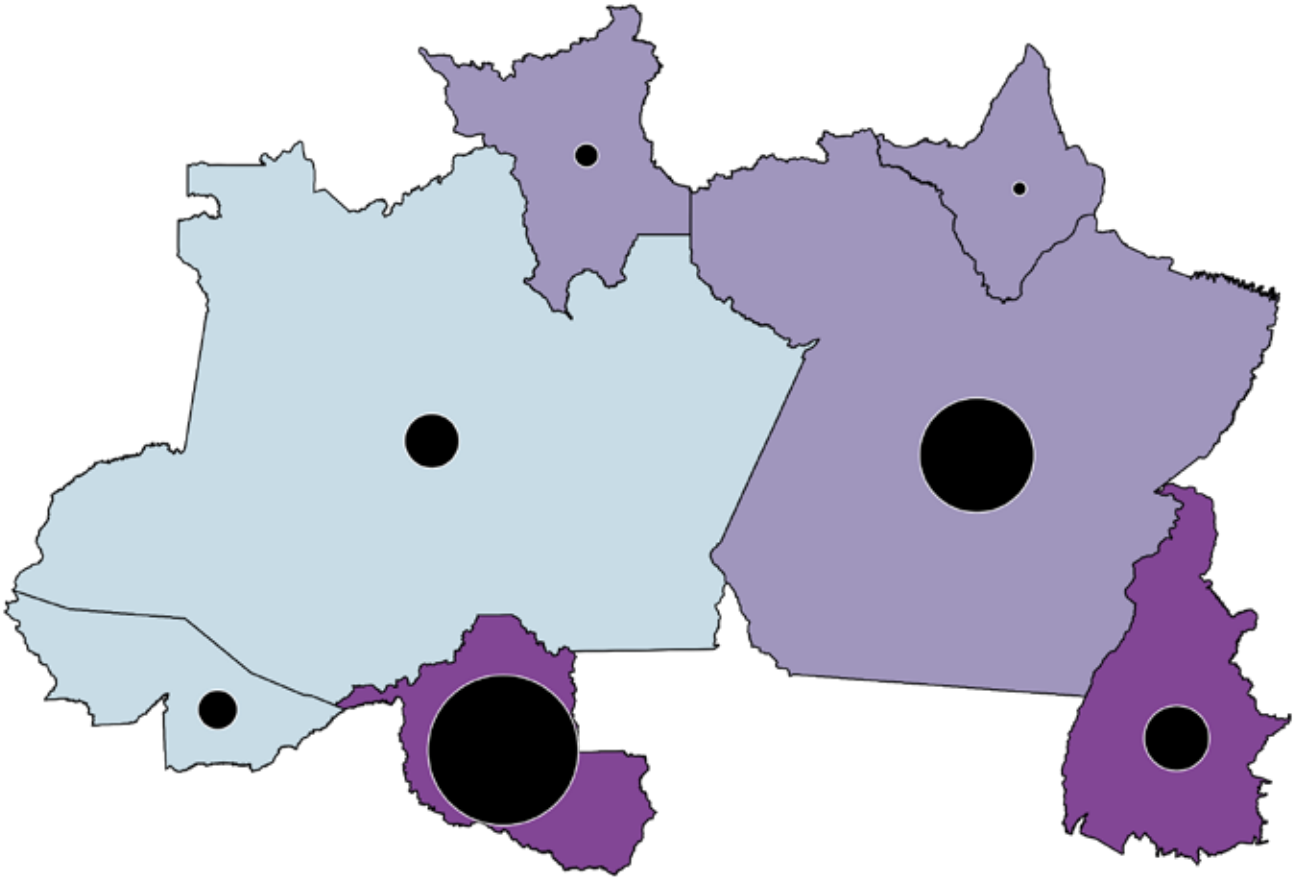
NORTH **AGROTOXIN USE**


NORTH AGROTOXIN USE
QUANTITY USED
Federation Units (2012 - 2014)
Mean annual pesticide use per federation unit in tons (t)
9,715 [Tocantins]
8,954 [Rondônia]
8,150 [Pará]
658 [Acre]
563 [Roraima]
80 [Amapá]
S
0 200 400 600
Km
Relationship between the mean annual pesticide use in (Kg) and the agricultural area of the FU in hectare (ha)
(Kg/ha)
4,27 - 7,55
0,67 - 4,26
0,10 - 0,66
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

NORTH **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Federation Units



Number of establishments using pesticides

35,023 [Rondônia]

20,334 [Pará]

6,571 [Tocantins]
4,649 [Amazonas]
2,419 [Acre]
297 [Amapá]

S

0 200 400 600 Km

Percentage of establishments using pesticides in relation to the total of establishments of the FU

(%)

- 11.62 - 40.22
- 8.41 - 11.61
- 6.96 - 8.40

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

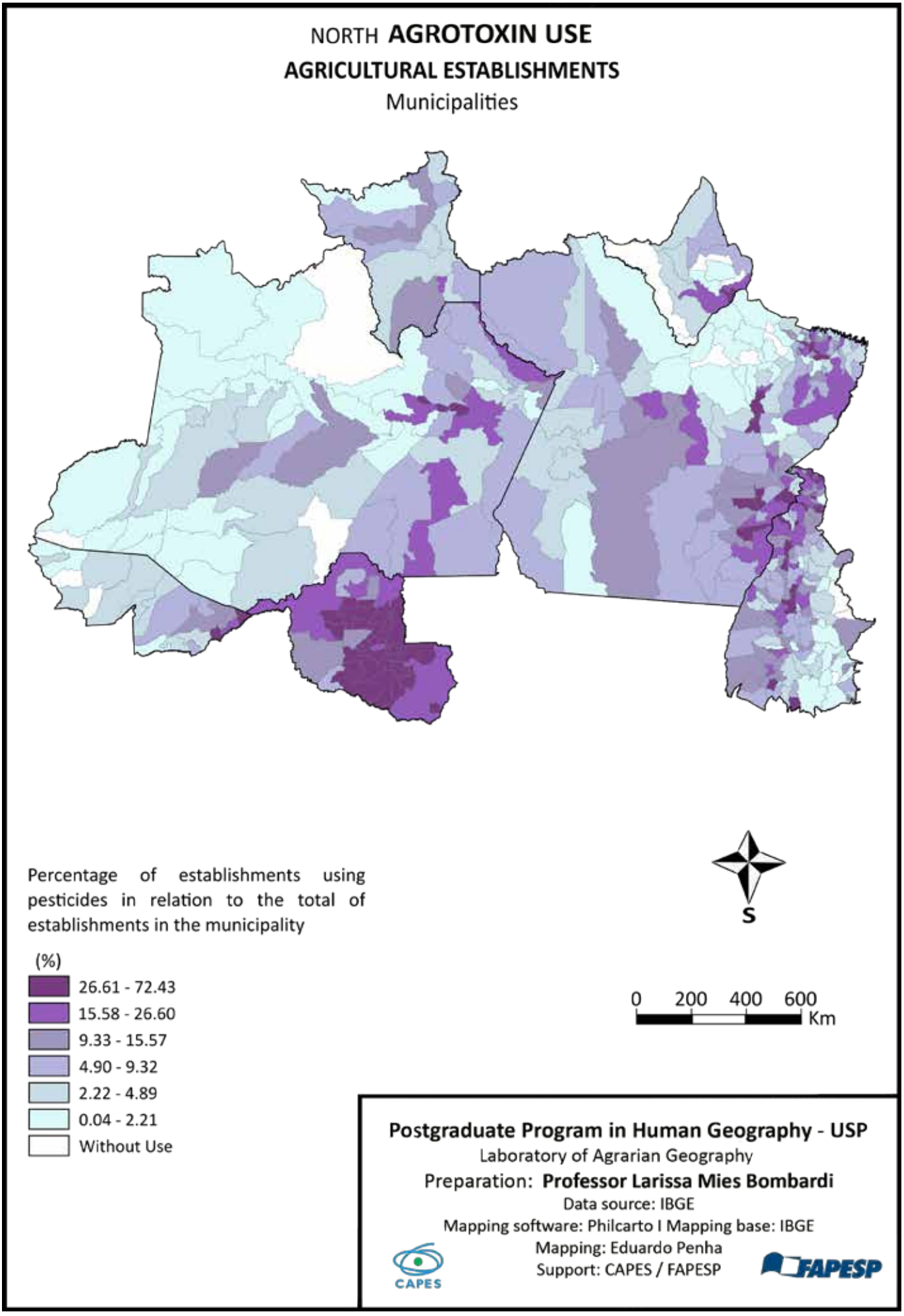
Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

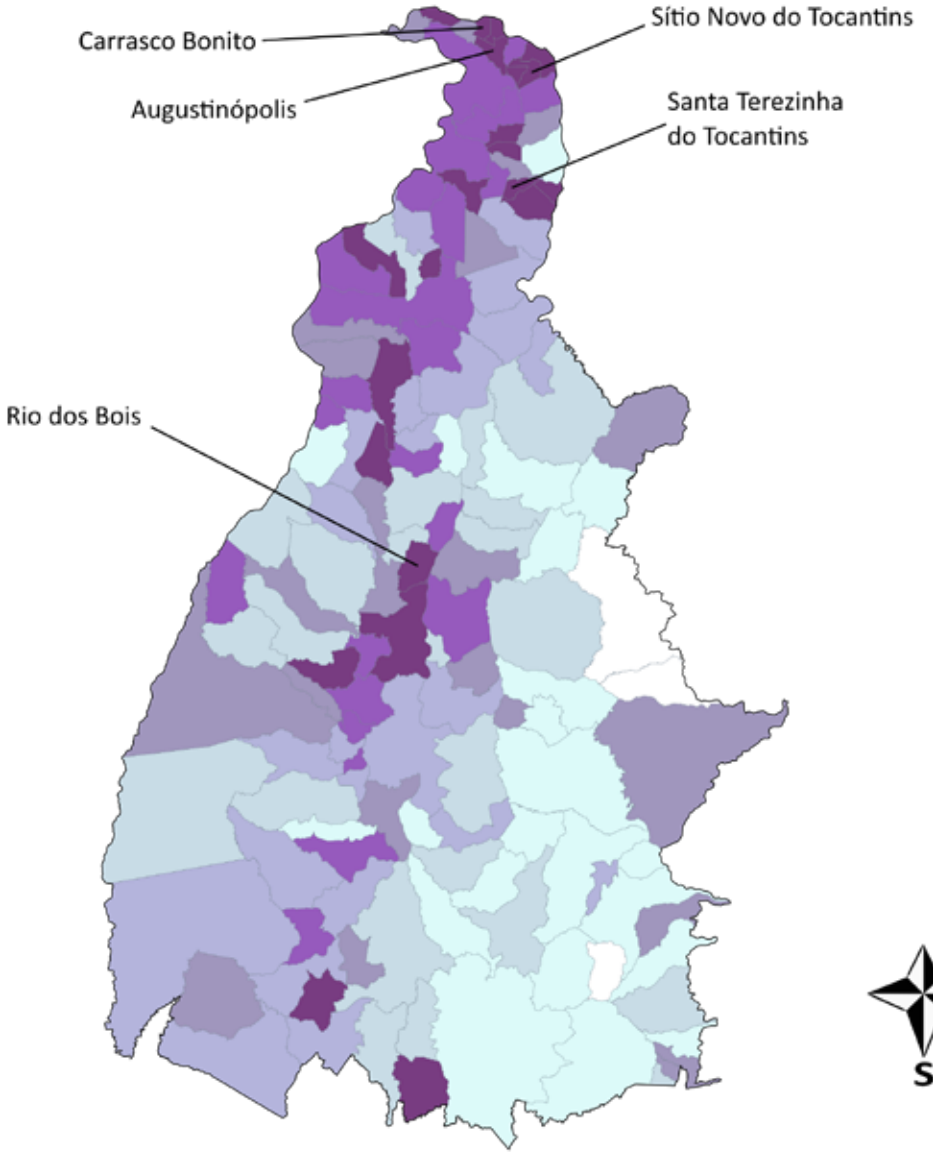
Support: CAPES / FAPESP


NORTH AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
26.61 - 72.43
15.58 - 26.60
9.33 - 15.57
4.90 - 9.32
2.22 - 4.89
0.04 - 2.21
Without Use
S
0 200 400 600
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

TOCANTINS **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



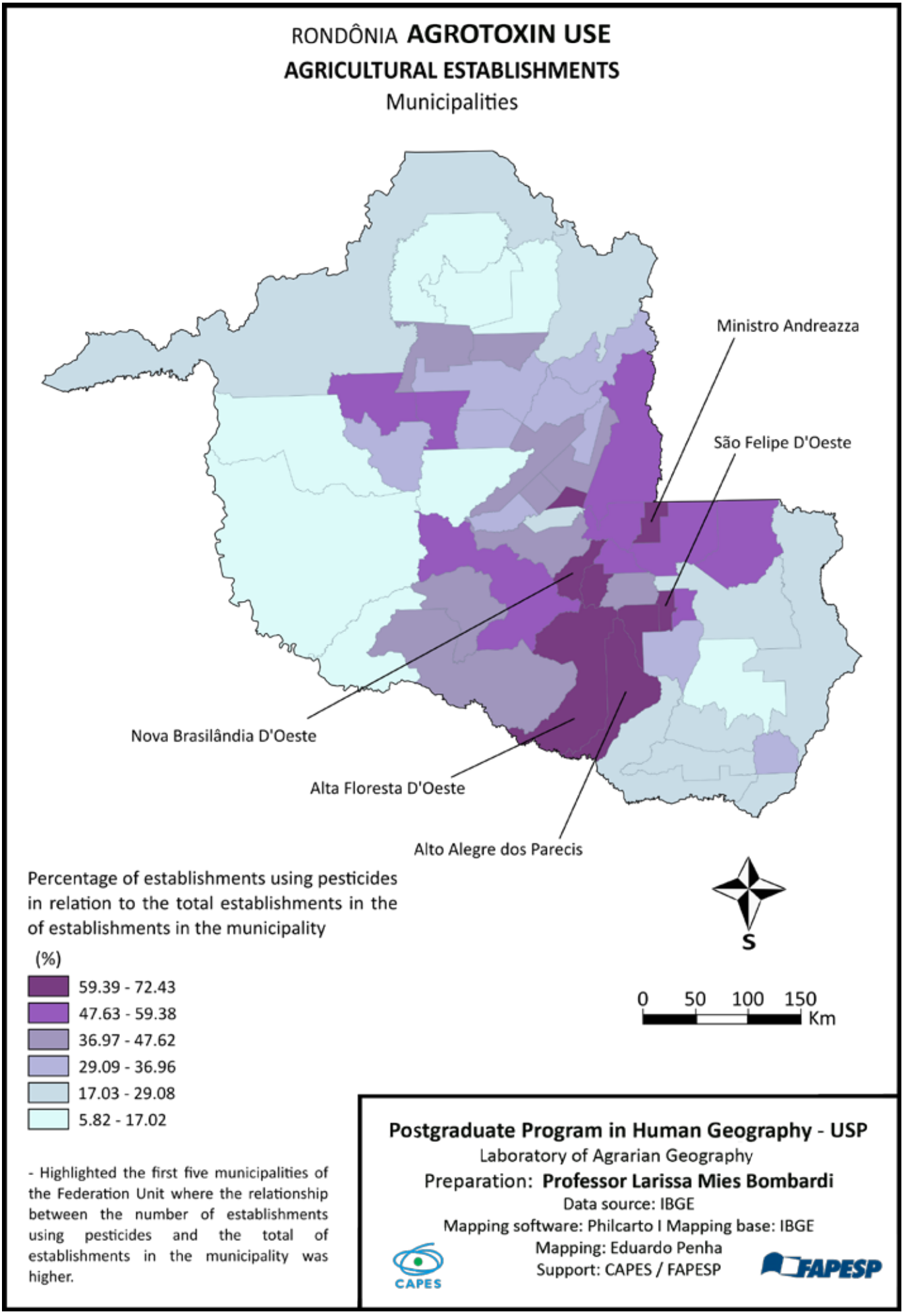
Percentage of establishments using pesticides in relation to the total establishments in the municipality

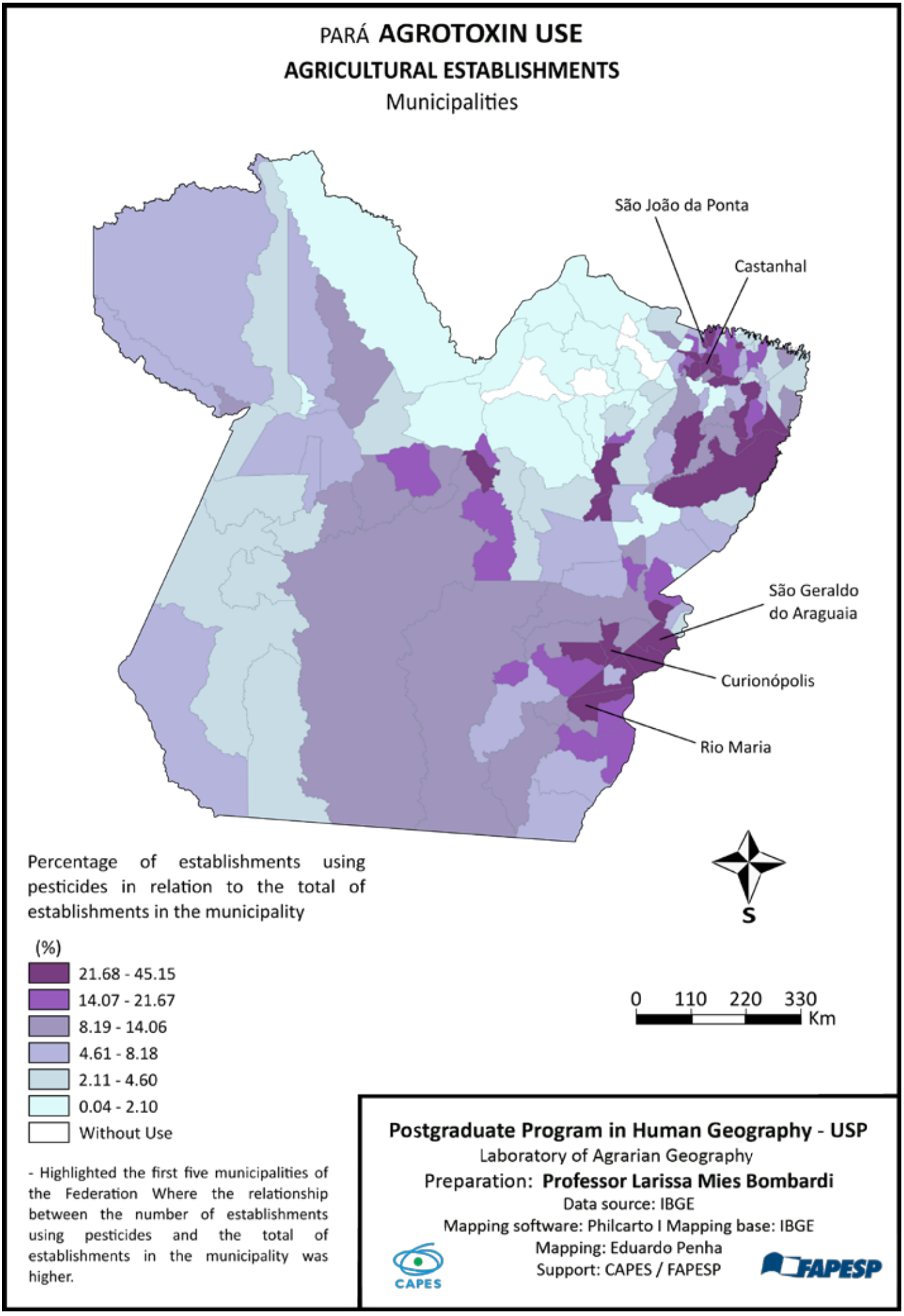
(%)

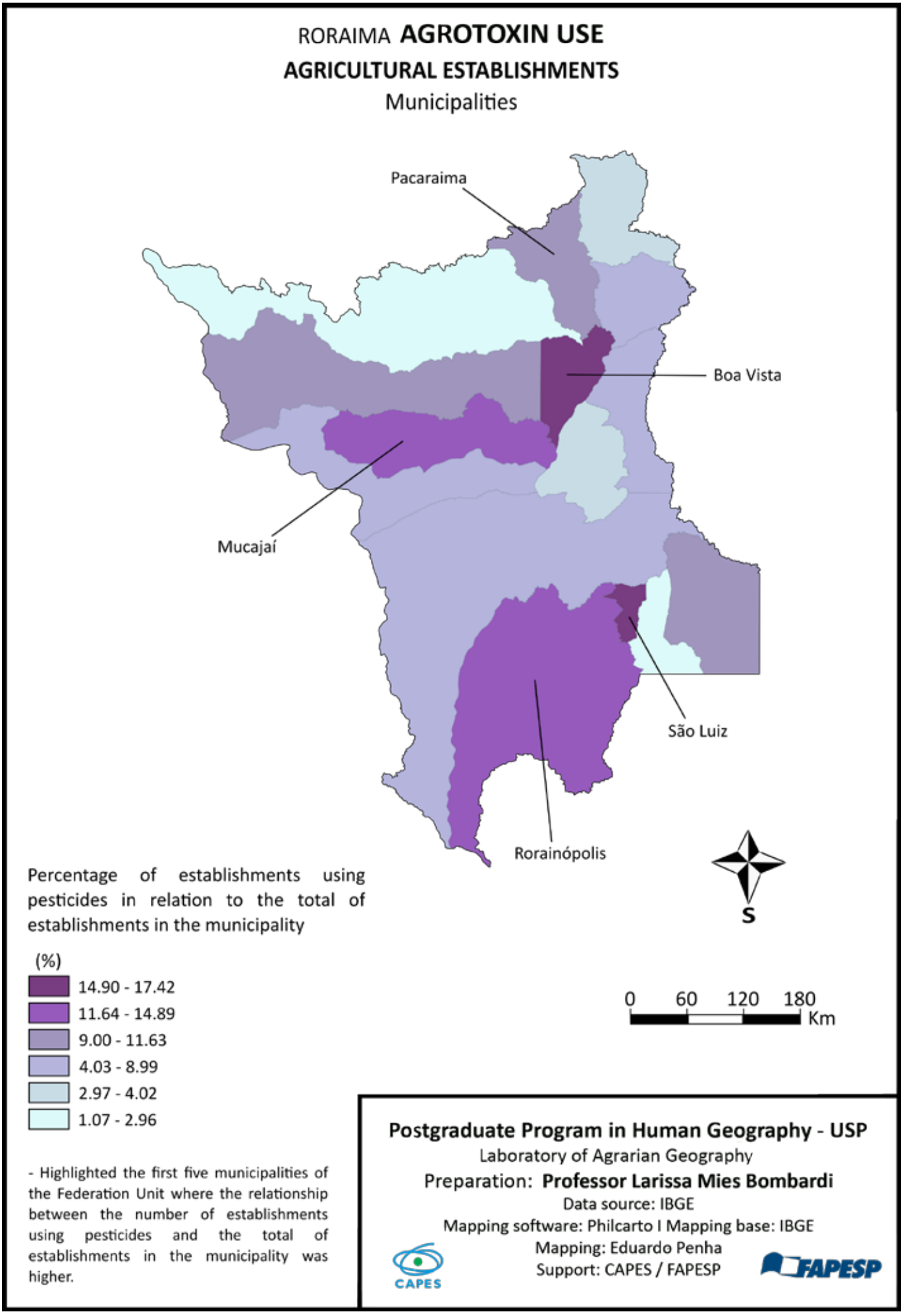
- 25.00 - 52.47
- 14.81 - 24.99
- 11.11 - 14.80
- 6.45 - 11.10
- 3.31 - 6.44
- 0.26 - 3.30
- Without Use

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP


RONDÔNIA AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Ministro Andreazza
São Felipe D'Oeste
Nova Brasilândia D'Oeste
Alta Floresta D'Oeste
Alto Alegre dos Parecis
Percentage of establishments using pesticides in relation to the total establishments in the of establishments in the municipality
(%)
59.39 - 72.43
47.63 - 59.38
36.97 - 47.62
29.09 - 36.96
17.03 - 29.08
5.82 - 17.02
S
0 50 100 150
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

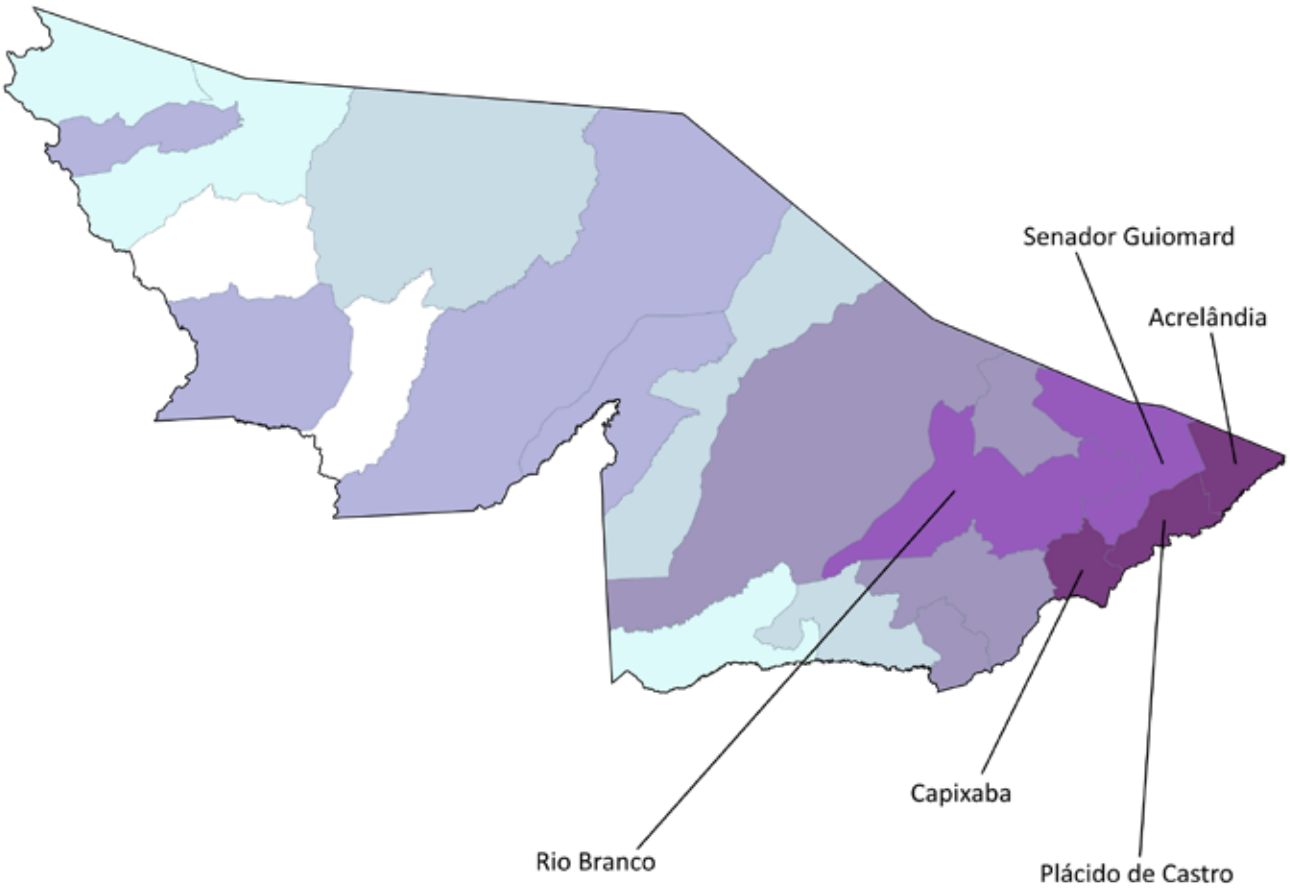

PARÁ AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
São João da Ponta
Castanhal
São Geraldo do Araguaia
Curionópolis
Rio Maria
S
0 110 220 330
Km
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
21.68 - 45.15
14.07 - 21.67
8.19 - 14.06
4.61 - 8.18
2.11 - 4.60
0.04 - 2.10
Without Use
- Highlighted the first five municipalities of the Federation Where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


RORAIMA AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Pacaraima
Boa Vista
Mucajaí
São Luiz
Rorainópolis
S
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
14.90 - 17.42
11.64 - 14.89
9.00 - 11.63
4.03 - 8.99
2.97 - 4.02
1.07 - 2.96
0 60 120 180
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

ACRE **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total of establishments in the municipality

(%)

- 20.48 - 41.39
- 9.77 - 20.47
- 4.64 - 9.76
- 3.21 - 4.63
- 2.56 - 3.20
- 0.58 - 2.55
- Without Use

S

0 50 100 150 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

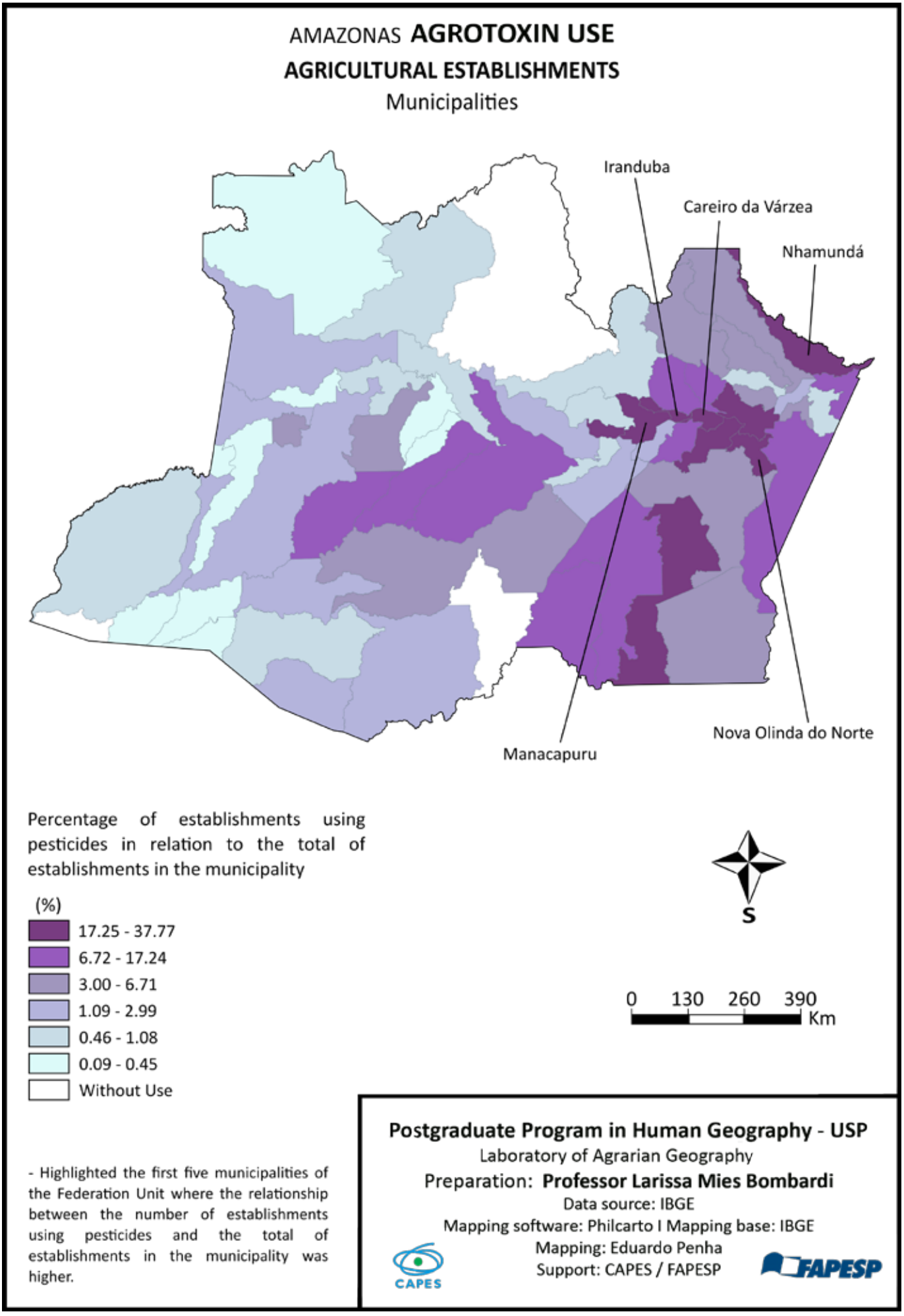
Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

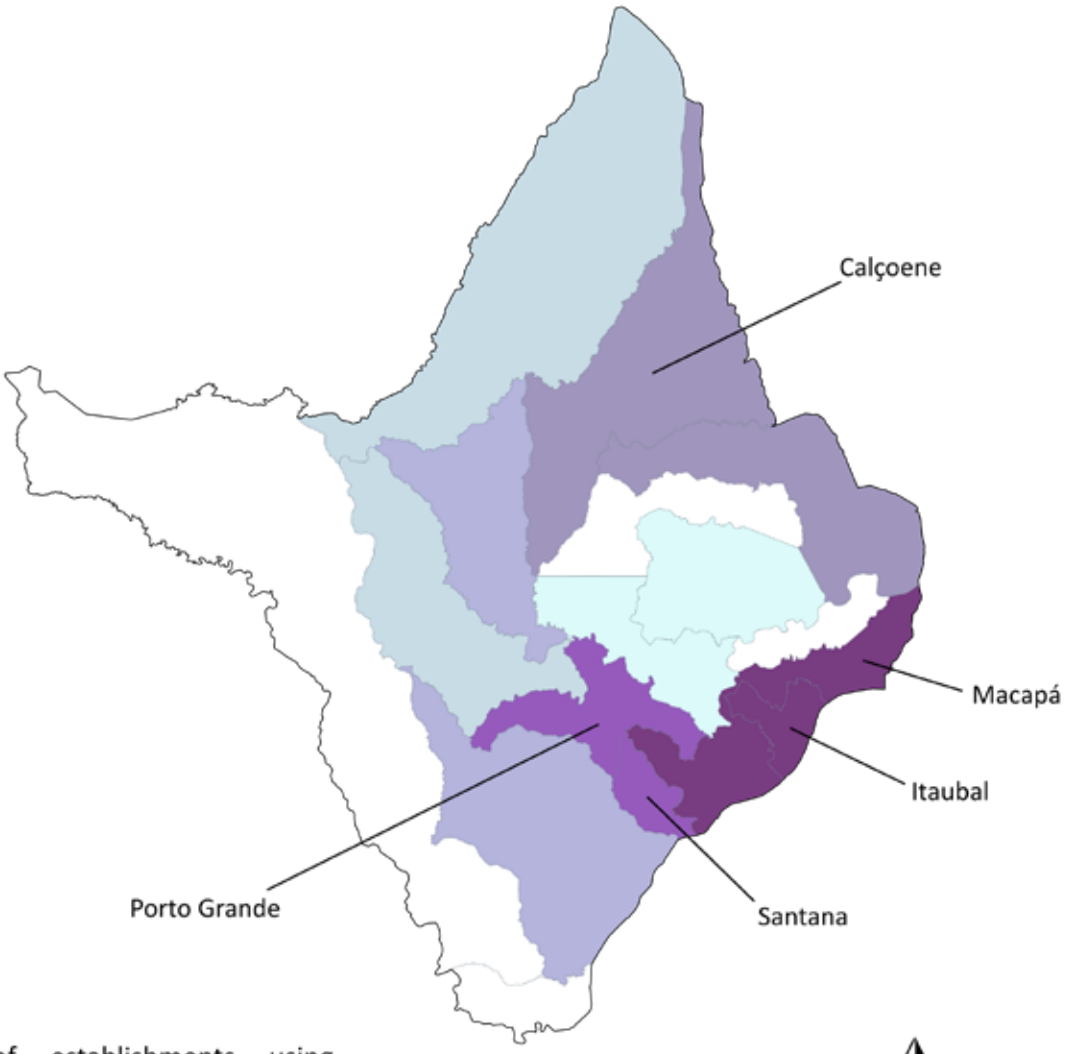
CAPES FAPESP


AMAZONAS AGROTOXIN USE
AGRICULTURAL ESTABLISHMENTS
Municipalities
Iranduba
Careiro da Várzea
Nhamundá
Manacapuru
Nova Olinda do Norte
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
17.25 - 37.77
6.72 - 17.24
3.00 - 6.71
1.09 - 2.99
0.46 - 1.08
0.09 - 0.45
Without Use
S
0 130 260 390
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

AMAPÁ **AGROTOXIN USE**

AGRICULTURAL ESTABLISHMENTS

Municipalities



Percentage of establishments using pesticides in relation to the total of establishments in the municipality

(%)

- 18.73 - 30.23
- 15.73 - 18.72
- 5.81 - 15.72
- 4.42 - 5.80
- 2.22 - 4.41
- 0.62 - 2.21
- Without Use

S

0 50 100 150 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of establishments using pesticides and the total of establishments in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

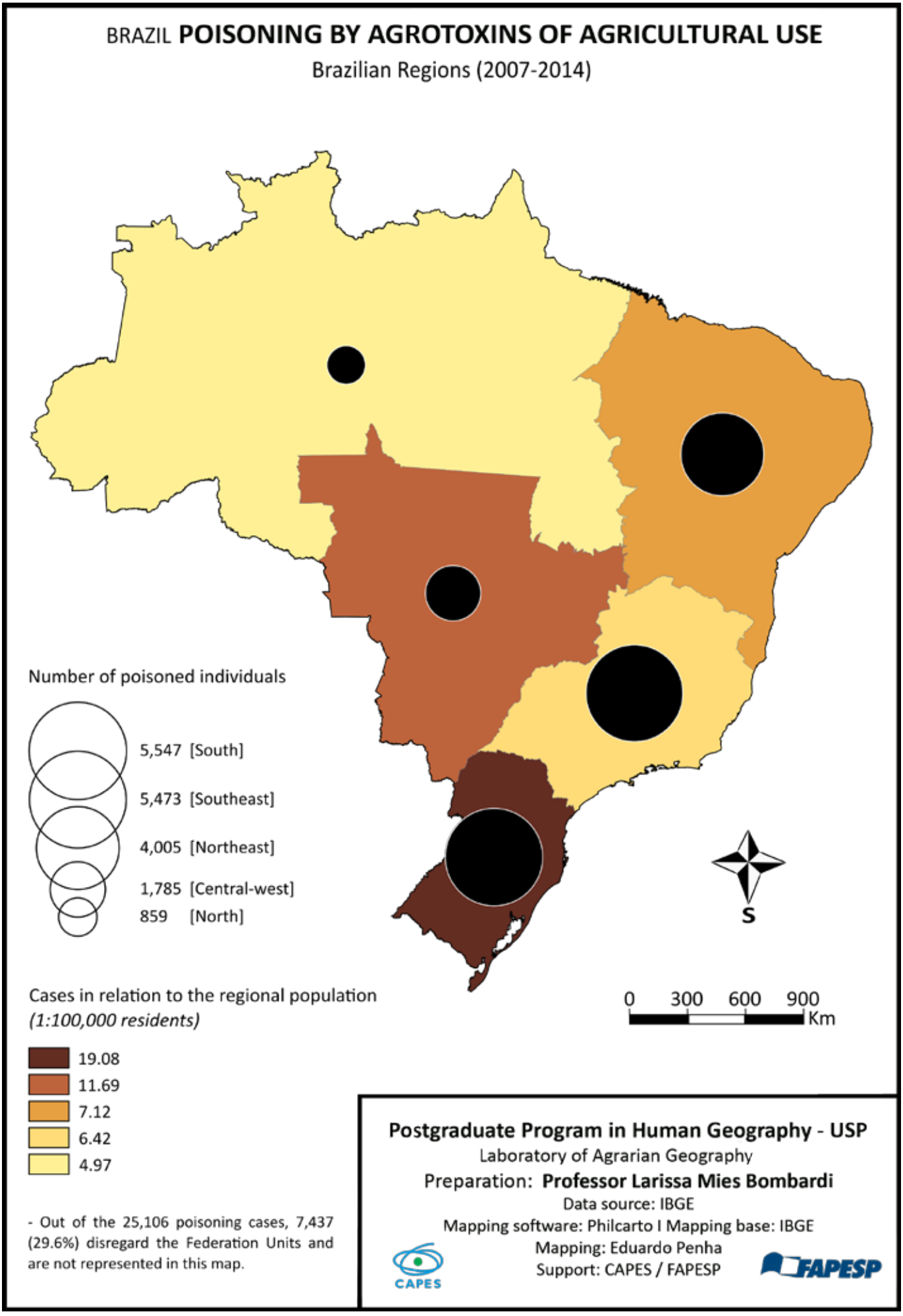
Data source: IBGE

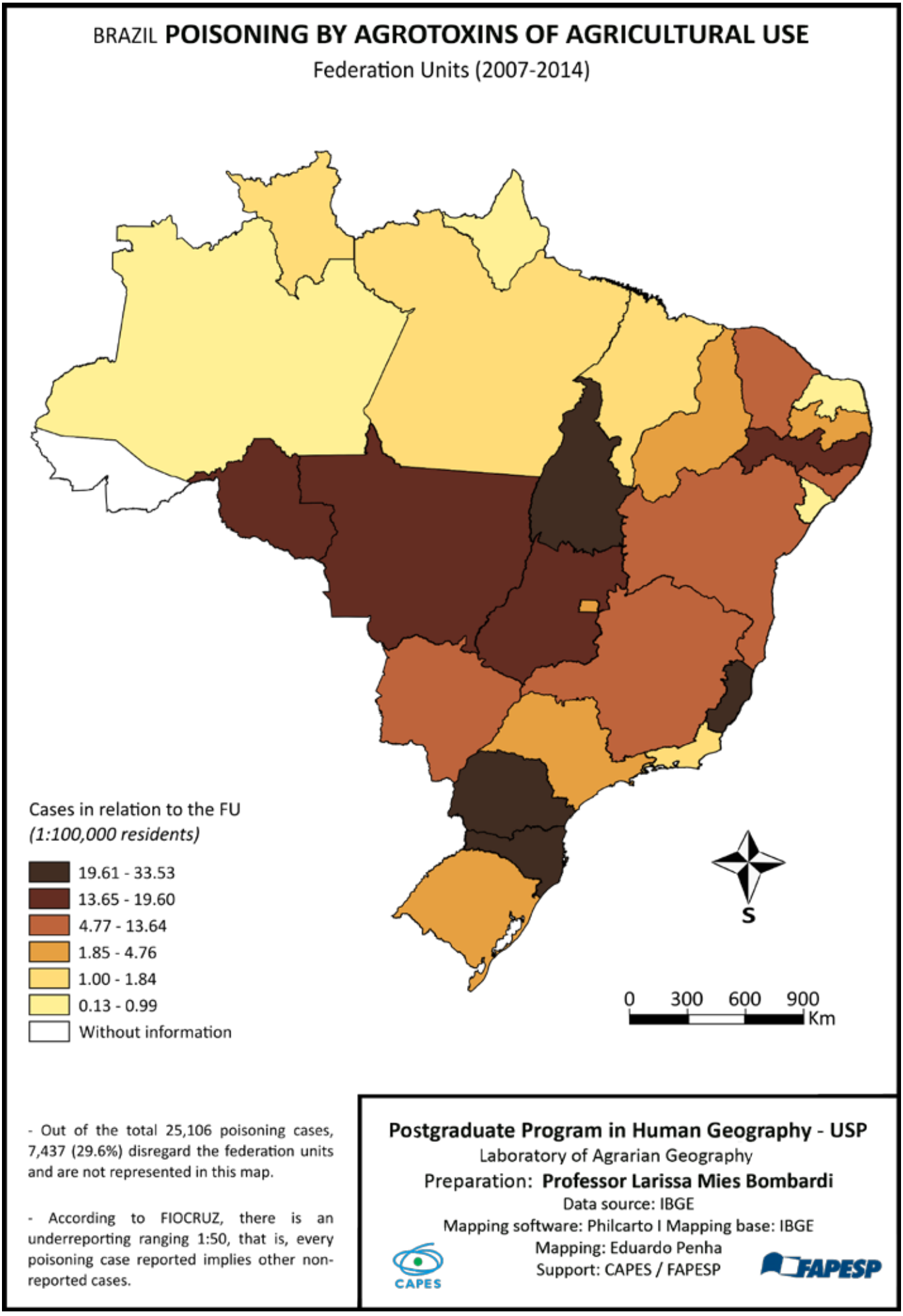
Mapping software: Philcarto I Mapping base: IBGE

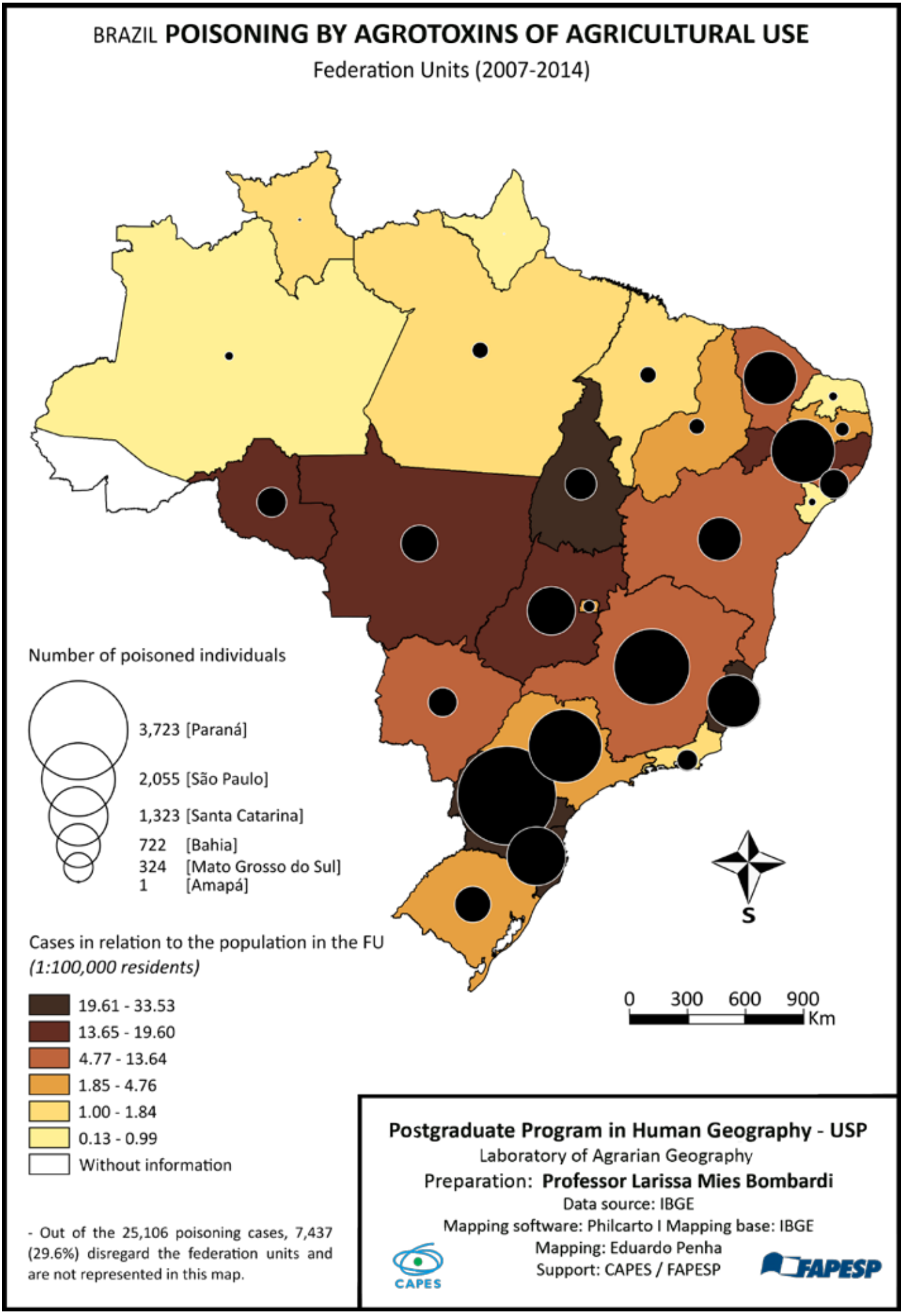
Mapping: Eduardo Penha

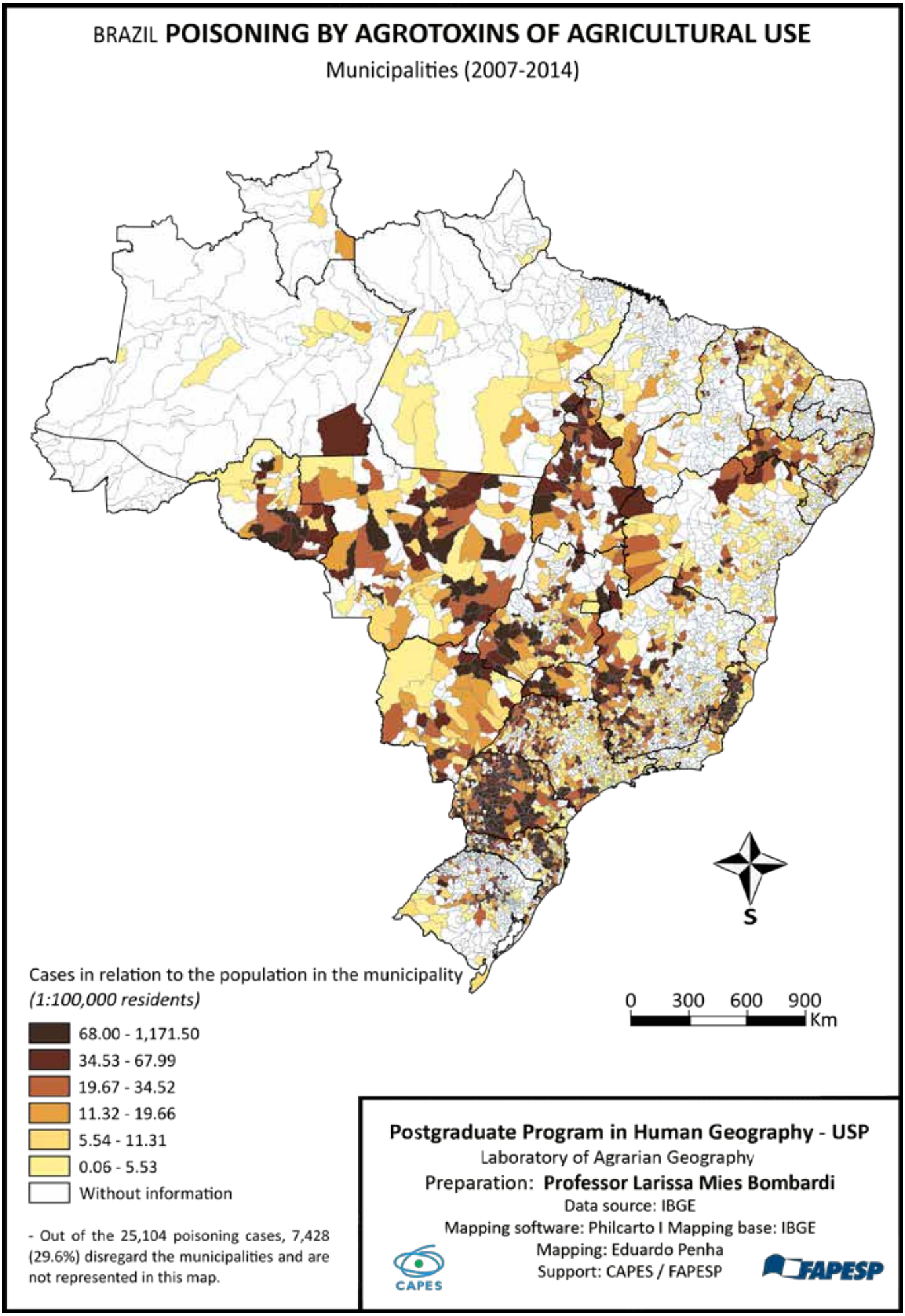
Support: CAPES / FAPESP

BRAZIL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**


BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
Brazilian Regions (2007-2014)
Number of poisoned individuals
5,547 [South]
5,473 [Southeast]
4,005 [Northeast]
1,785 [Central-west]
859 [North]
S
0 300 600 900
Km
Cases in relation to the regional population
(1:100,000 residents)
19.08
11.69
7.12
6.42
4.97
- Out of the 25,106 poisoning cases, 7,437 (29.6%) disregard the Federation Units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

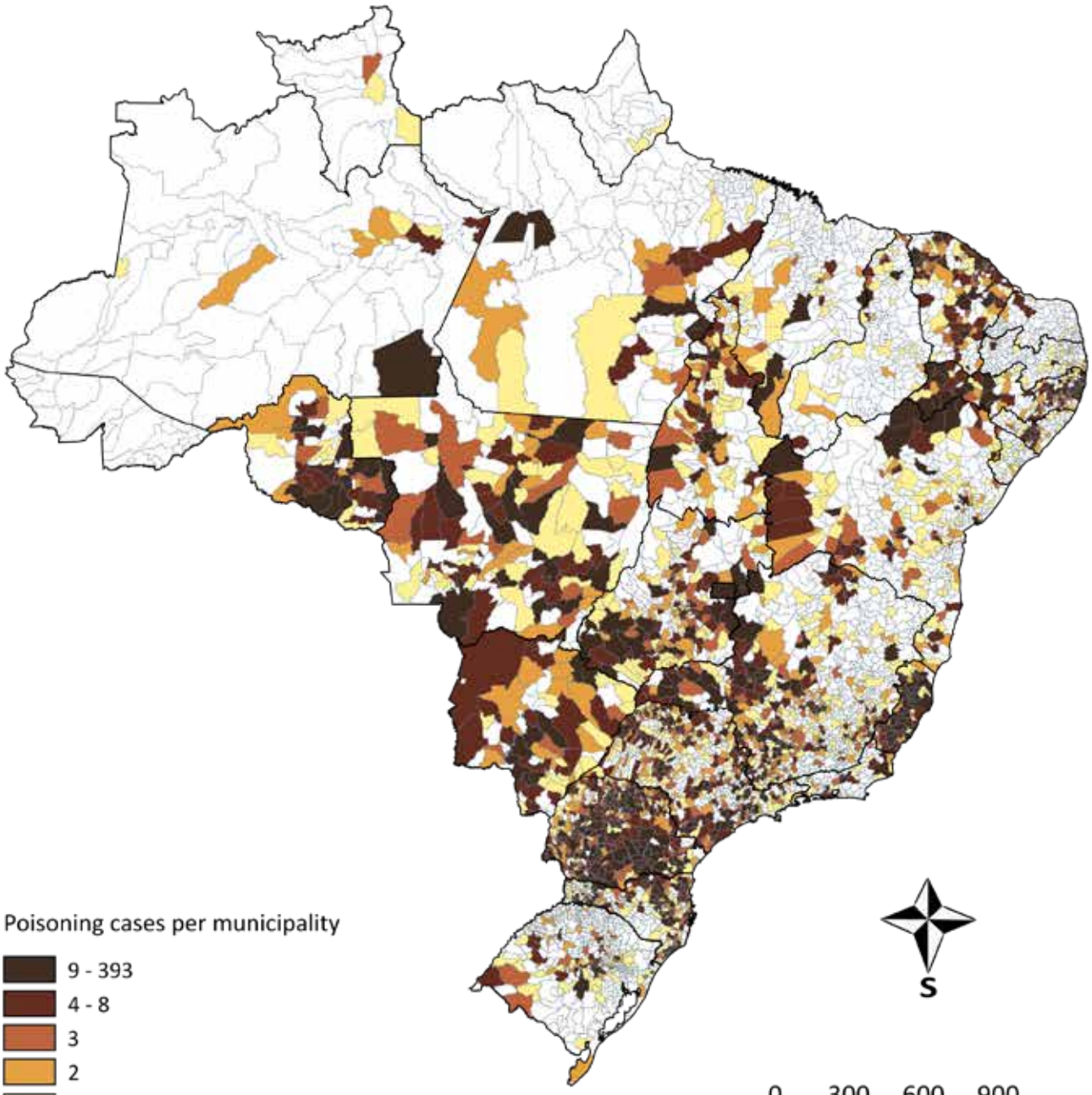

BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
Federation Units (2007-2014)
Cases in relation to the FU
(1:100,000 residents)
19.61 - 33.53
13.65 - 19.60
4.77 - 13.64
1.85 - 4.76
1.00 - 1.84
0.13 - 0.99
Without information
S
0 300 600 900
Km
- Out of the total 25,106 poisoning cases, 7,437 (29.6%) disregard the federation units and are not represented in this map.
- According to FIOCRUZ, there is an underreporting ranging 1:50, that is, every poisoning case reported implies other non-reported cases.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
Federation Units (2007-2014)
Number of poisoned individuals
3,723 [Paraná]
2,055 [São Paulo]
1,323 [Santa Catarina]
722 [Bahia]
324 [Mato Grosso do Sul]
1 [Amapá]
Cases in relation to the population in the FU
(1:100,000 residents)
19.61 - 33.53
13.65 - 19.60
4.77 - 13.64
1.85 - 4.76
1.00 - 1.84
0.13 - 0.99
Without information
S
0 300 600 900
Km
- Out of the 25,106 poisoning cases, 7,437 (29.6%) disregard the federation units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
S
Cases in relation to the population in the municipality
(1:100,000 residents)
68.00 - 1,171.50
34.53 - 67.99
19.67 - 34.52
11.32 - 19.66
5.54 - 11.31
0.06 - 5.53
Without information
0 300 600 900
Km
- Out of the 25,104 poisoning cases, 7,428 (29.6%) disregard the municipalities and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

BRAZIL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

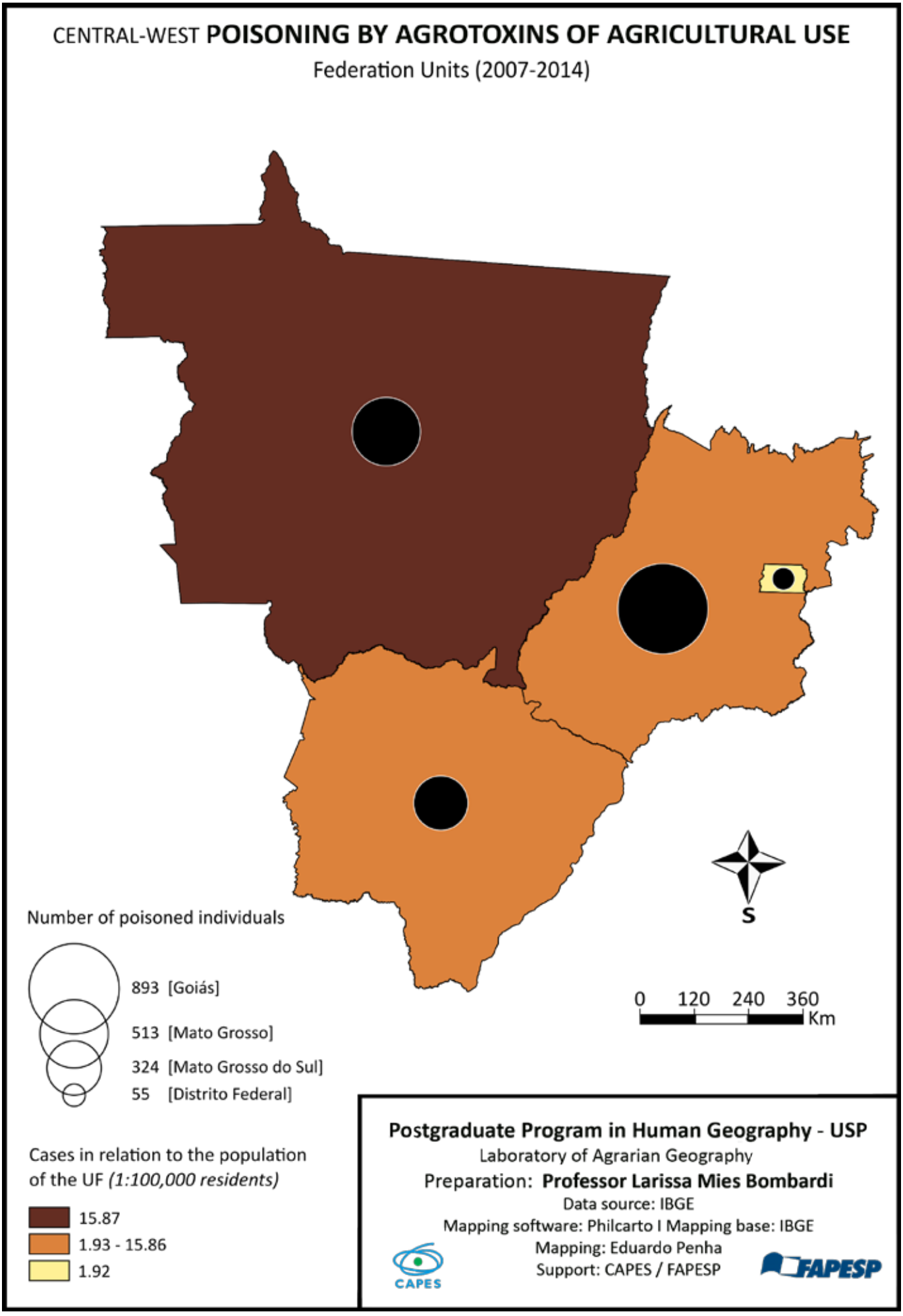
Municipalities (2007-2014)

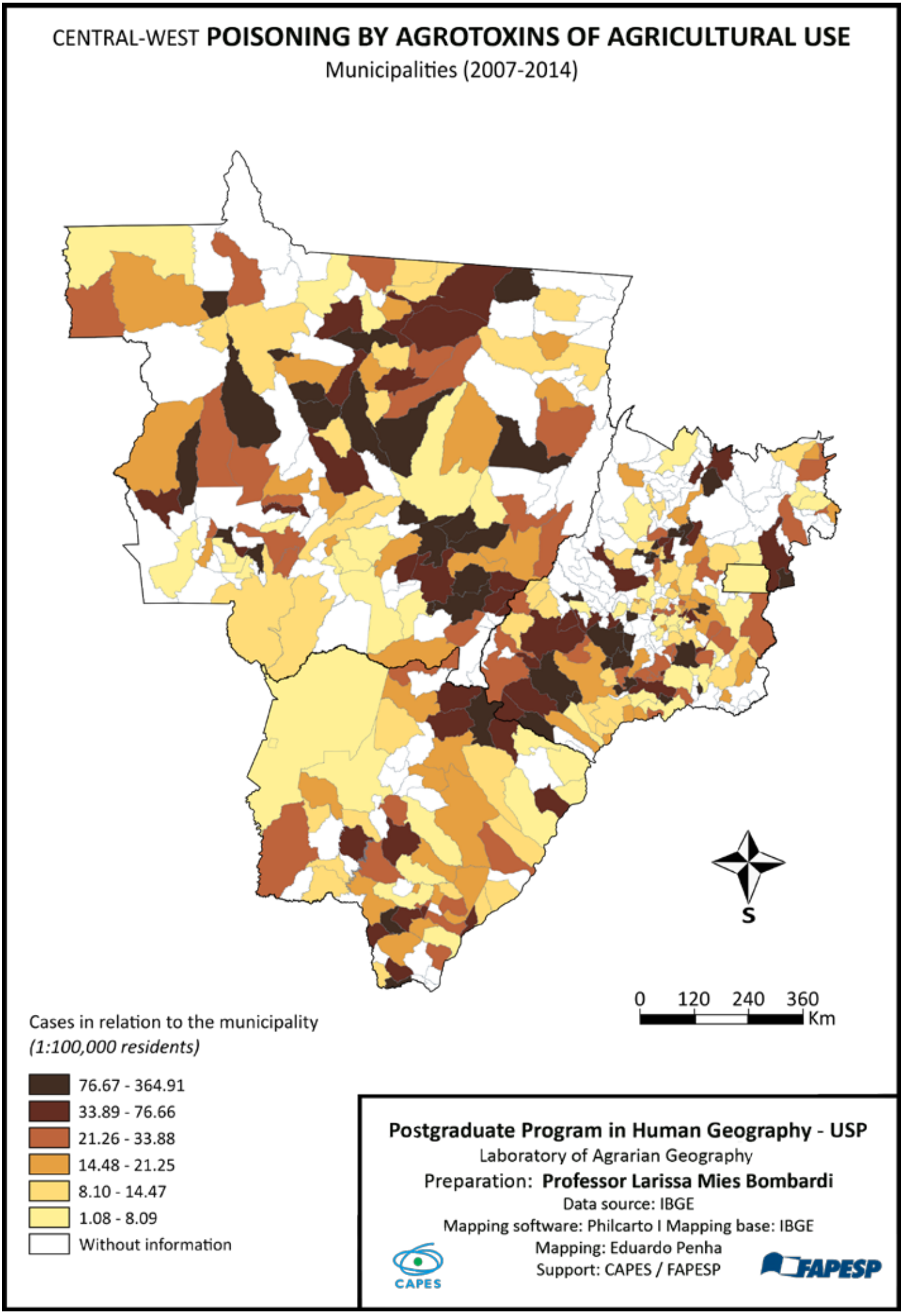


- Out of the 25,104 poisioning cases, 7,428 (29.6%) disregard the municipalities and are not represented in this map.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

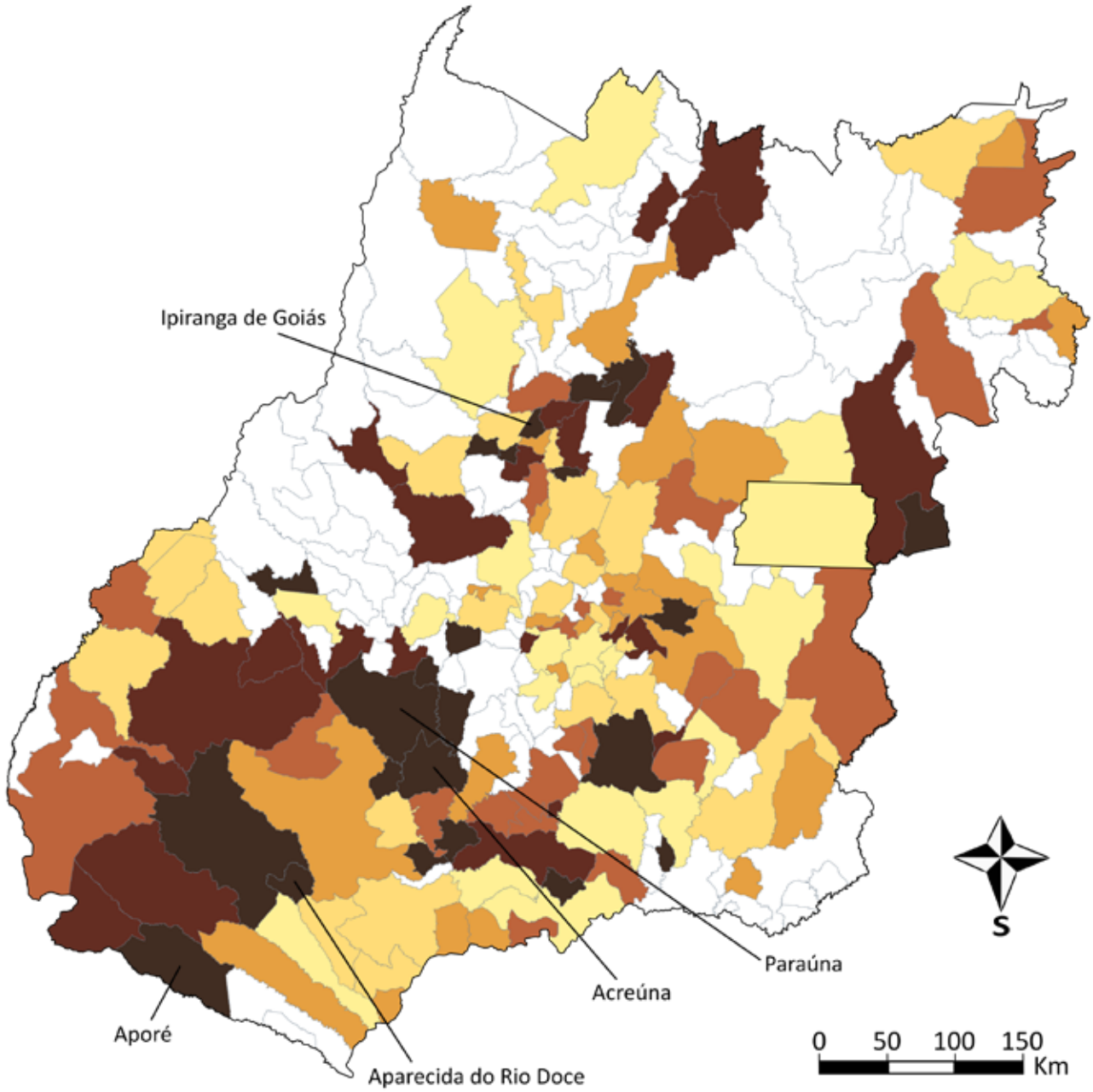
CENTRAL-WEST **POISONING BY AGROTOXINS OF AGRICULTURAL USE**


CENTRAL-WEST POISONING BY AGROTOXINS OF AGRICULTURAL USE
Federation Units (2007-2014)
Number of poisoned individuals
893 [Goiás]
513 [Mato Grosso]
324 [Mato Grosso do Sul]
55 [Distrito Federal]
S
0 120 240 360
Km
Cases in relation to the population of the UF (1:100,000 residents)
15.87
1.93 - 15.86
1.92
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


CENTRAL-WEST POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
S
0 120 240 360
Km
Cases in relation to the municipality
(1:100,000 residents)
76.67 - 364.91
33.89 - 76.66
21.26 - 33.88
14.48 - 21.25
8.10 - 14.47
1.08 - 8.09
Without information
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

GOIÁS and DF **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)

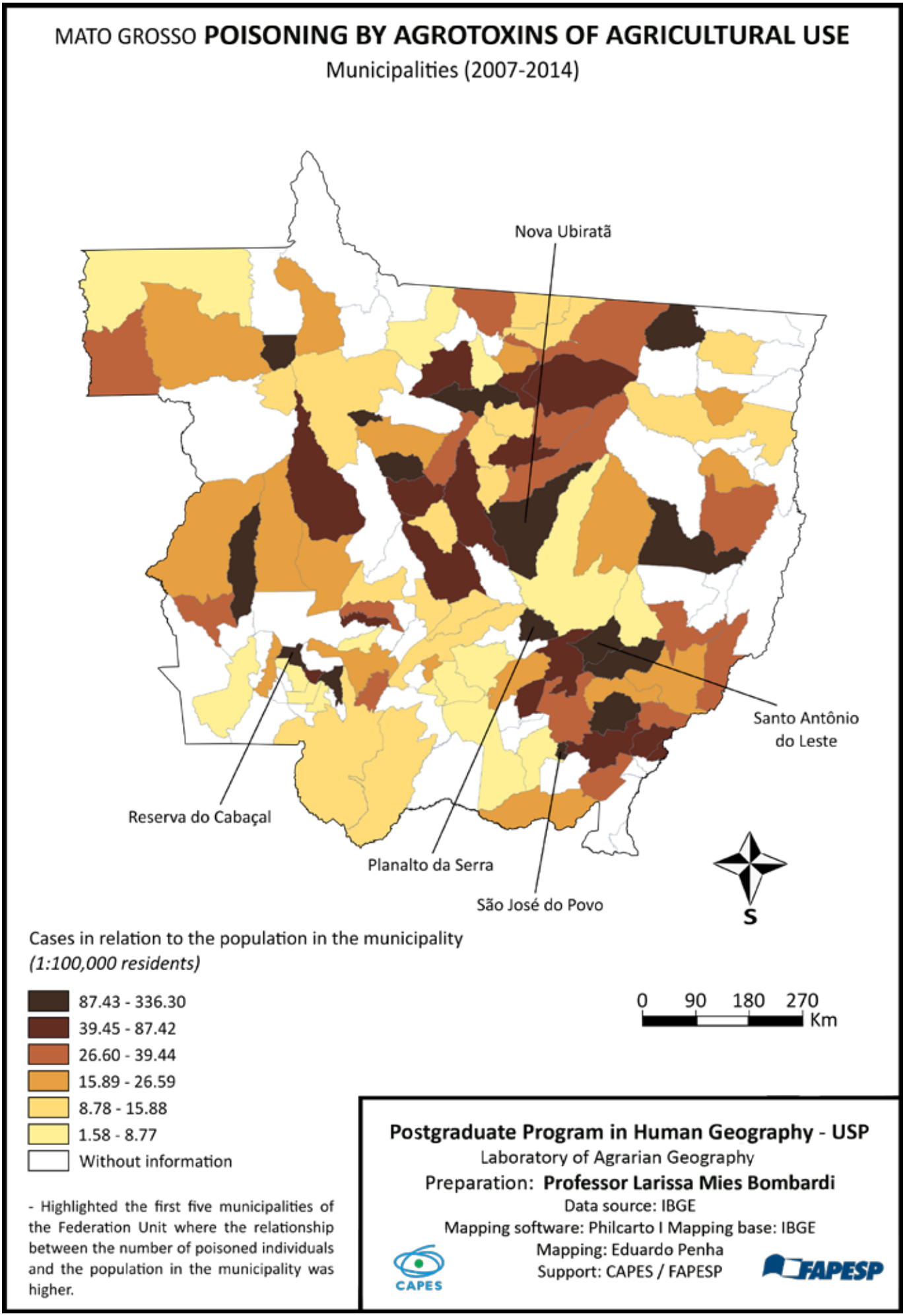


Cases in relation to the population in the municipality
(1:100,000 residents)

- 86.66 - 364.91
- 34.42 - 86.65
- 21.70 - 34.41
- 14.46 - 21.69
- 8.23 - 14.45
- 1.08 - 8.22
- Without information

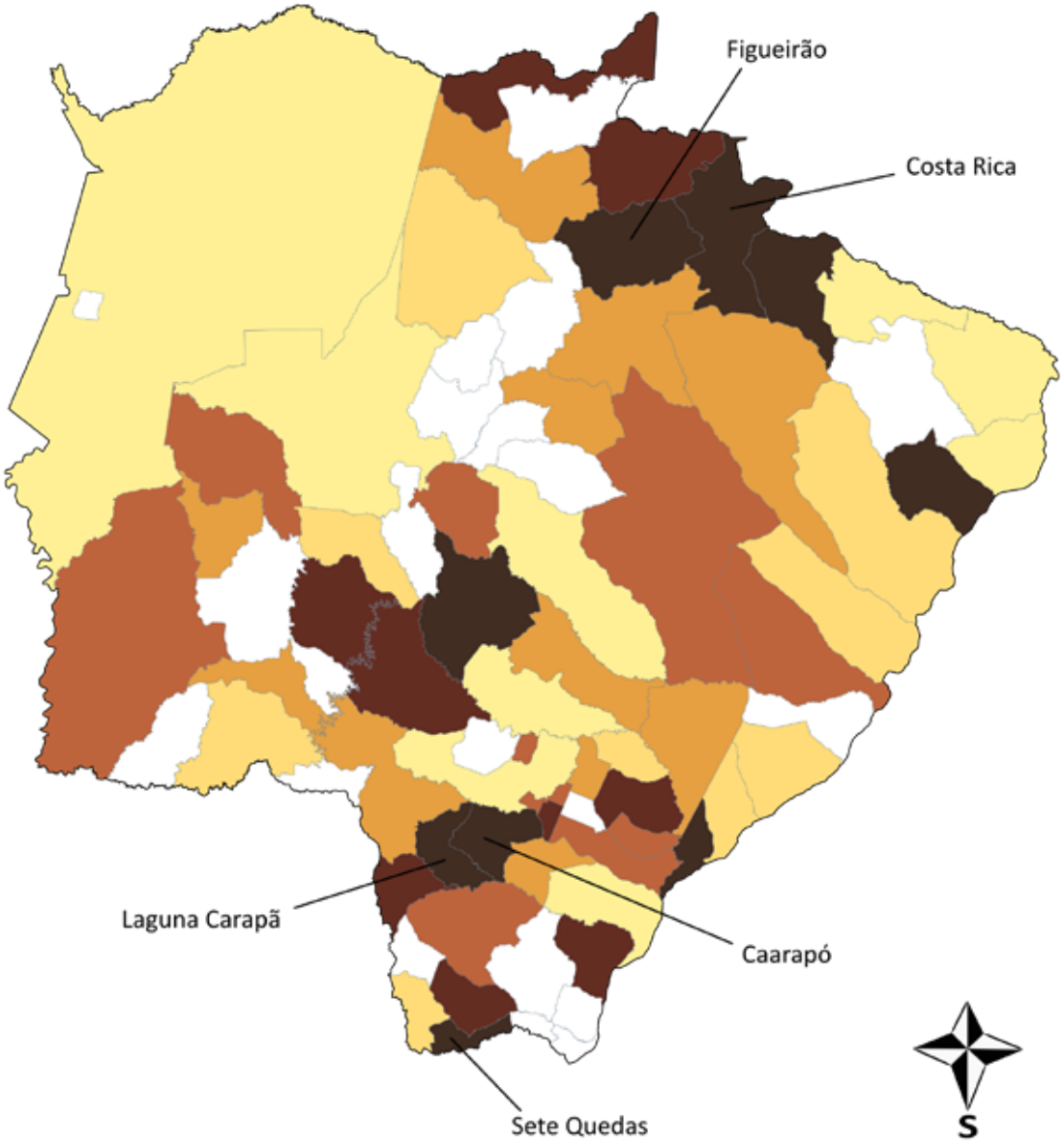
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP


MATO GROSSO POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Nova Ubiratã
Santo Antônio do Leste
Reserva do Cabaçal
Planalto da Serra
São José do Povo
S
Cases in relation to the population in the municipality
(1:100,000 residents)
87.43 - 336.30
39.45 - 87.42
26.60 - 39.44
15.89 - 26.59
8.78 - 15.88
1.58 - 8.77
Without information
0 90 180 270
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

MATO GROSSO DO SUL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

- 47.72 - 246.50
- 31.33 - 47.71
- 18.64 - 31.32
- 12.32 - 18.63
- 7.86 - 12.31
- 2.04 - 7.85
- Without information

0 60 120 180 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

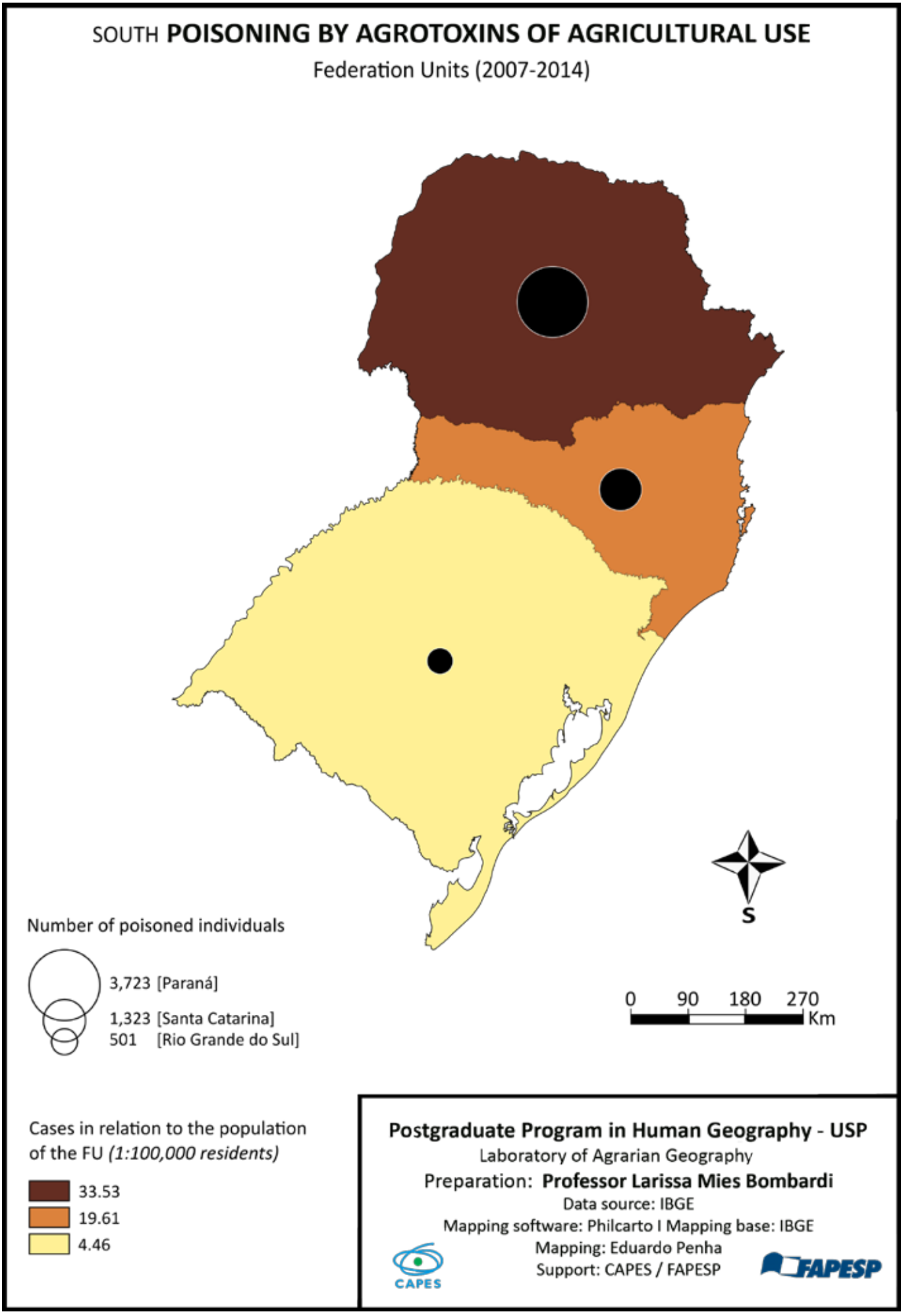
Data source: IBGE

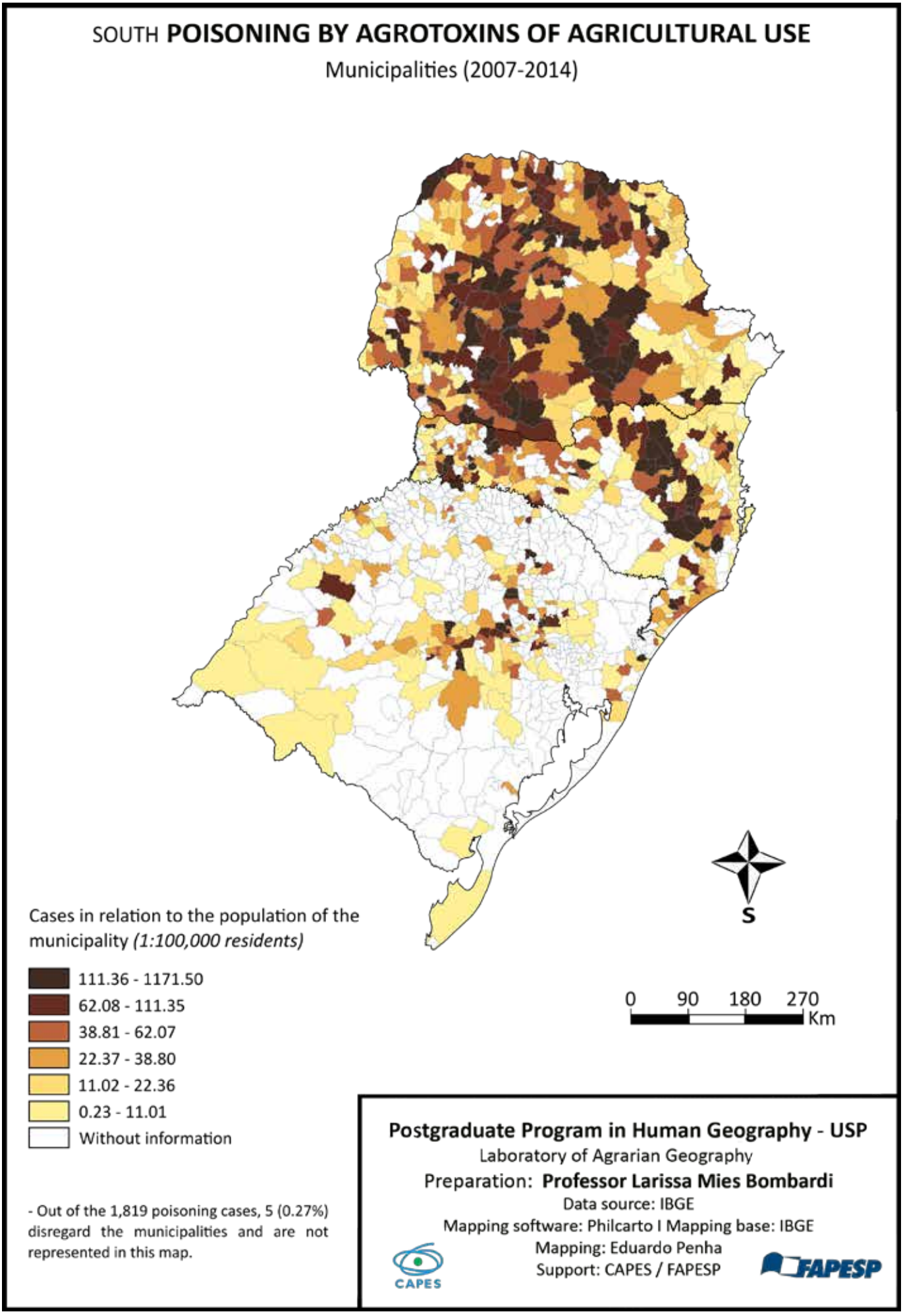
Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

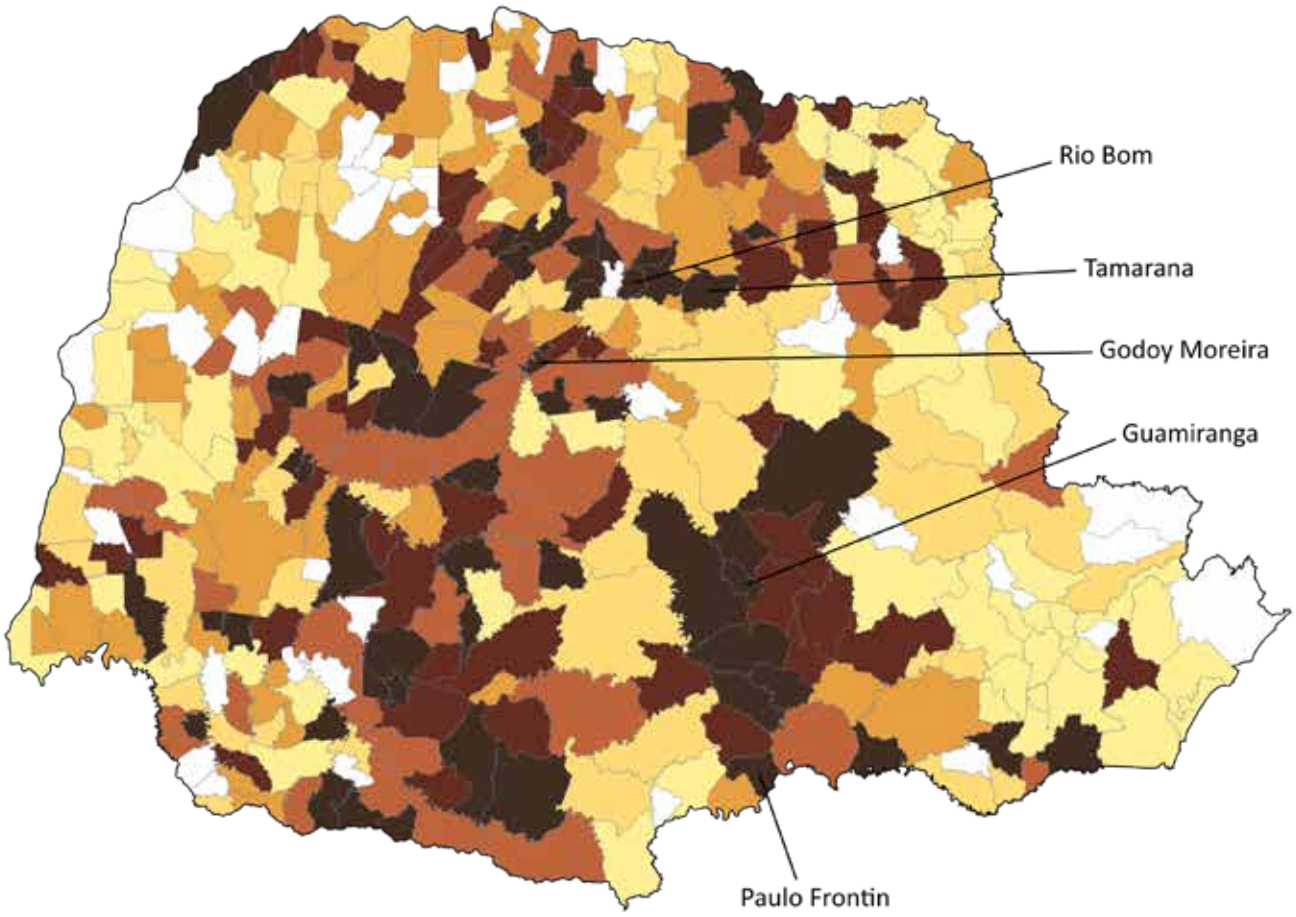
SOUTH **POISONING BY AGROTOXINS OF AGRICULTURAL USE**


SOUTH POISONING BY AGROTOXINS OF AGRICULTURAL USE
Federation Units (2007-2014)
S
Number of poisoned individuals
3,723 [Paraná]
1,323 [Santa Catarina]
501 [Rio Grande do Sul]
0 90 180 270
Km
Cases in relation to the population of the FU (1:100,000 residents)
33.53
19.61
4.46
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


SOUTH POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Cases in relation to the population of the municipality (1:100,000 residents)
111.36 - 1171.50
62.08 - 111.35
38.81 - 62.07
22.37 - 38.80
11.02 - 22.36
0.23 - 11.01
Without information
S
0 90 180 270
Km
- Out of the 1,819 poisoning cases, 5 (0.27%) disregard the municipalities and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

PARANÁ **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

- 127.39 - 1,164.56
- 78.21 - 127.38
- 50.34 - 78.20
- 30.53 - 50.33
- 16.63 - 30.52
- 0.85 - 16.62
- Without information

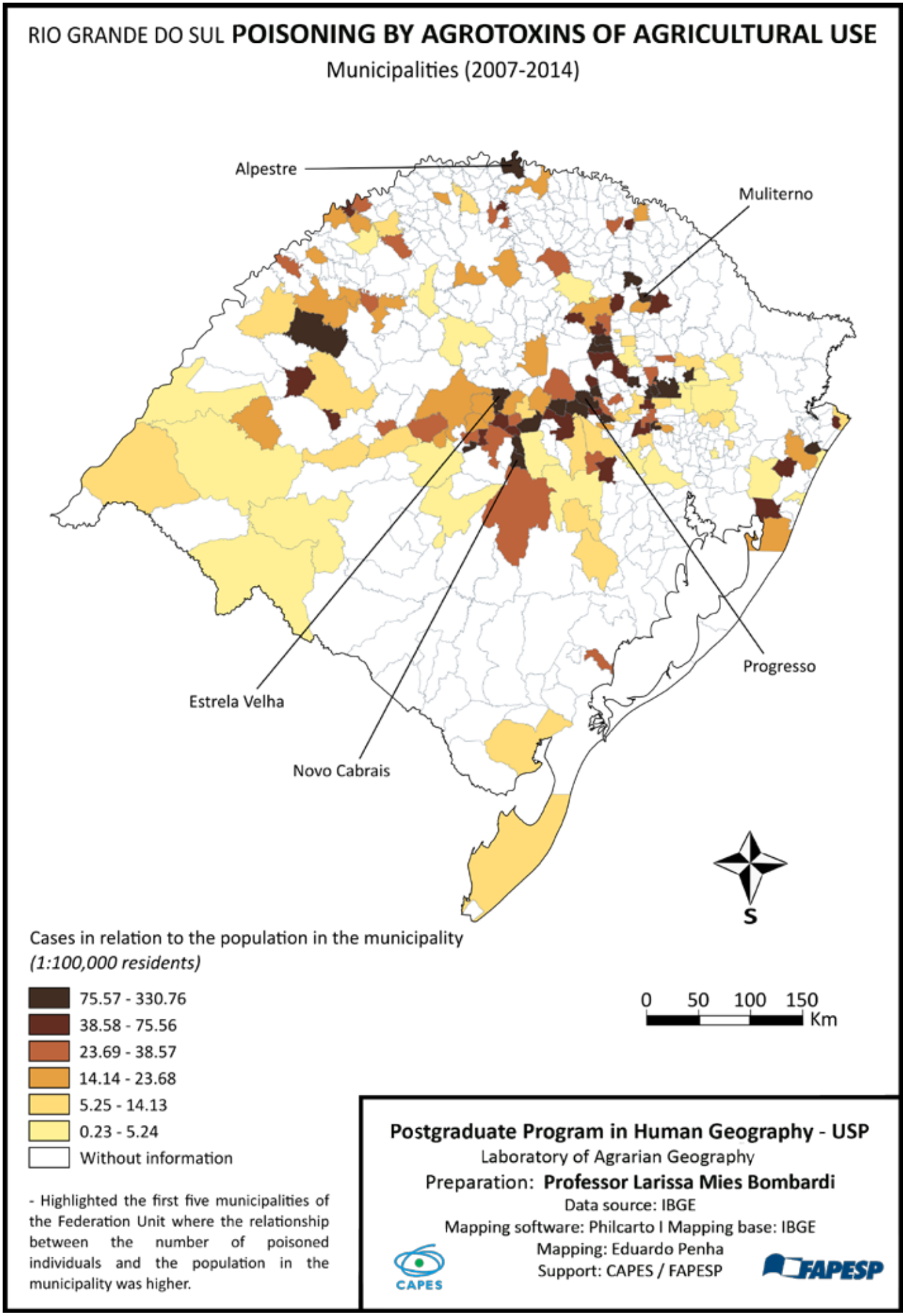
S

0 40 80 120 Km

- Out of the 3,730 poisoning cases, 5 (0.13%) disregard the municipalities and are not represented in this map.

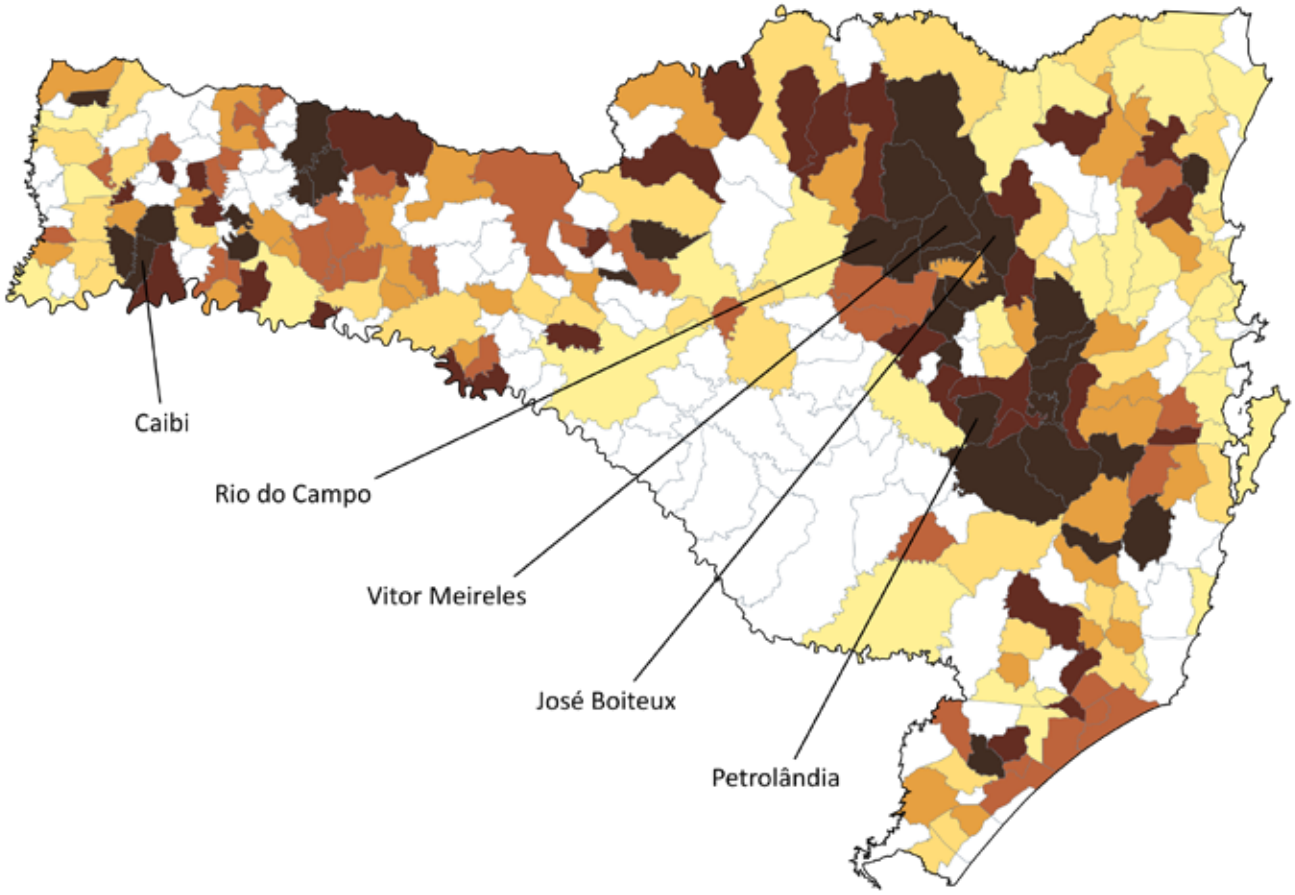
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP


RIO GRANDE DO SUL POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Alpestre
Muliterno
Progresso
Estrela Velha
Novo Cabrais
S
Cases in relation to the population in the municipality
(1:100,000 residents)
75.57 - 330.76
38.58 - 75.56
23.69 - 38.57
14.14 - 23.68
5.25 - 14.13
0.23 - 5.24
Without information
0 50 100 150
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

SANTA CATARINA **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

- 103.35 - 1171.50
- 55.11 - 103.34
- 33.99 - 55.10
- 18.36 - 33.98
- 9.27 - 18.35
- 0.93 - 9.26
- Without information

S

0 35 70 105 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

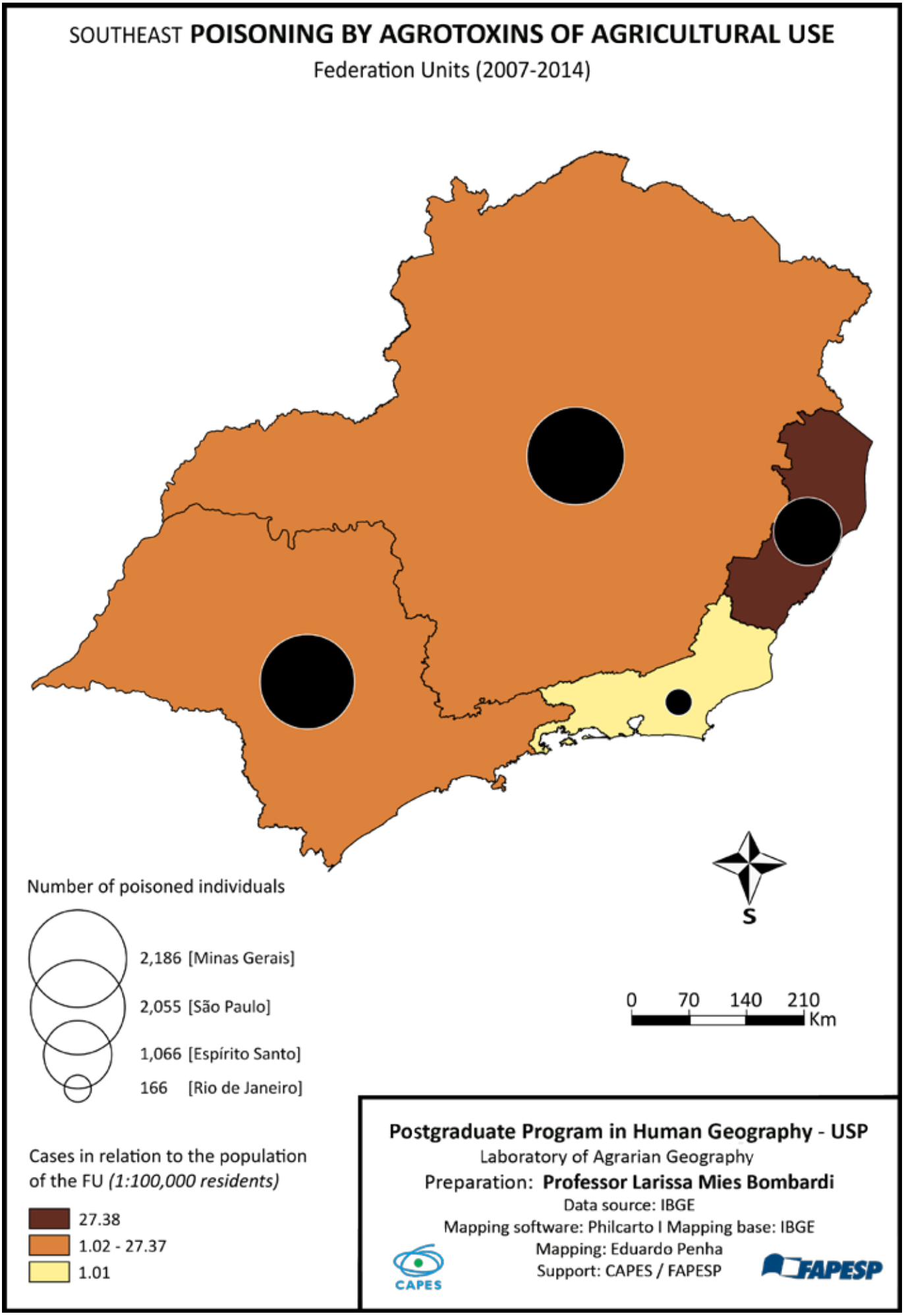
Data source: IBGE

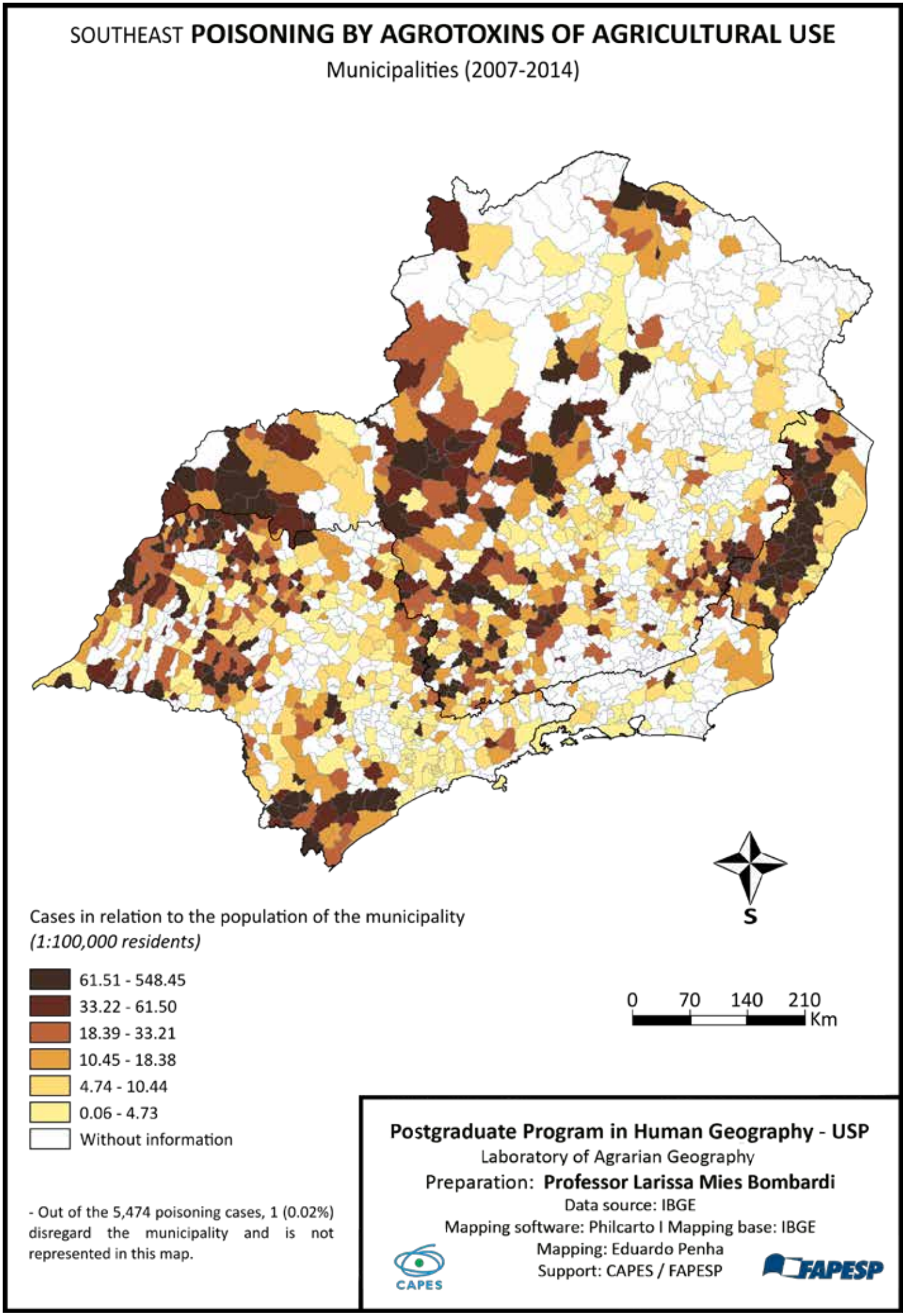
Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

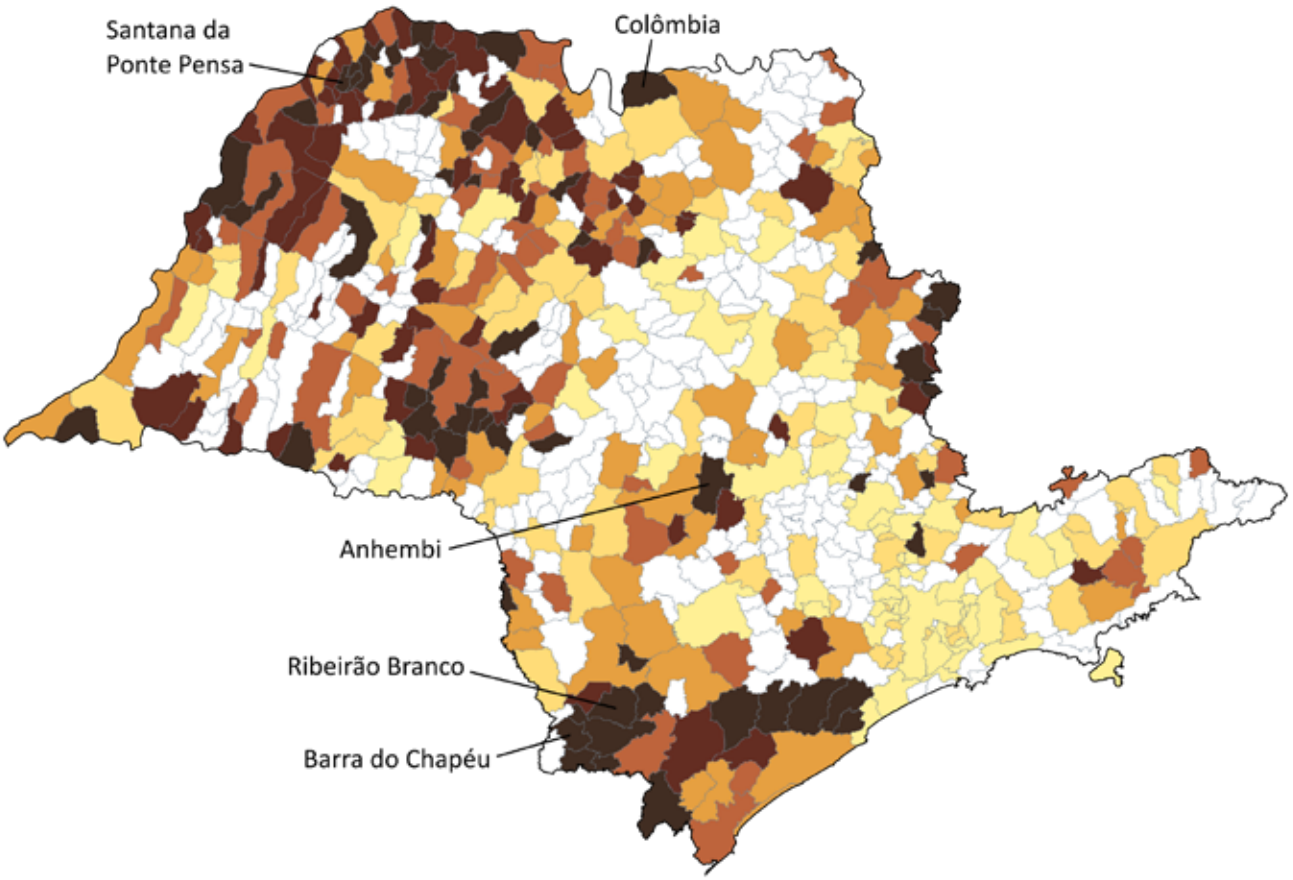
SOUTHEAST **POISONING BY AGROTOXINS OF AGRICULTURAL USE**


SOUTHEAST POISONING BY AGROTOXINS OF AGRICULTURAL USE
Federation Units (2007-2014)
Number of poisoned individuals
2,186 [Minas Gerais]
2,055 [São Paulo]
1,066 [Espírito Santo]
166 [Rio de Janeiro]
S
0 70 140 210
Km
Cases in relation to the population of the FU (1:100,000 residents)
27.38
1.02 - 27.37
1.01
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


SOUTHEAST POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
S
Cases in relation to the population of the municipality
(1:100,000 residents)
61.51 - 548.45
33.22 - 61.50
18.39 - 33.21
10.45 - 18.38
4.74 - 10.44
0.06 - 4.73
Without information
0 70 140 210
Km
- Out of the 5,474 poisoning cases, 1 (0.02%) disregard the municipality and is not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

SÃO PAULO **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

- 55.45 - 548.45
- 31.16 - 55.44
- 17.62 - 31.15
- 9.12 - 17.61
- 3.86 - 9.11
- 0.15 - 3.85
- Without information

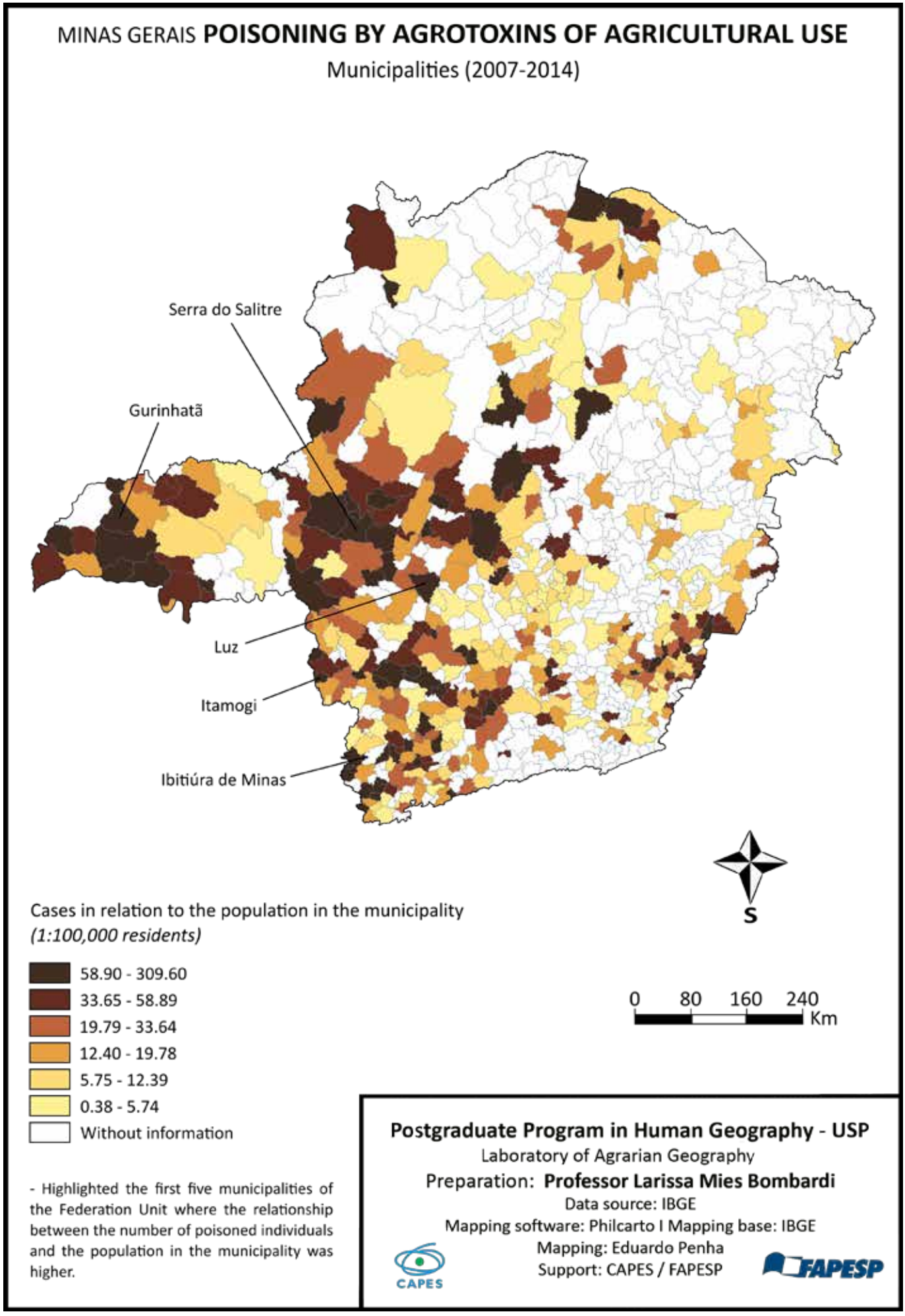
S

0 60 120 180 Km

- Out of the 2,057 poisioning cases, 1 (0.05%) disregard the municipality and is not represented in this map.

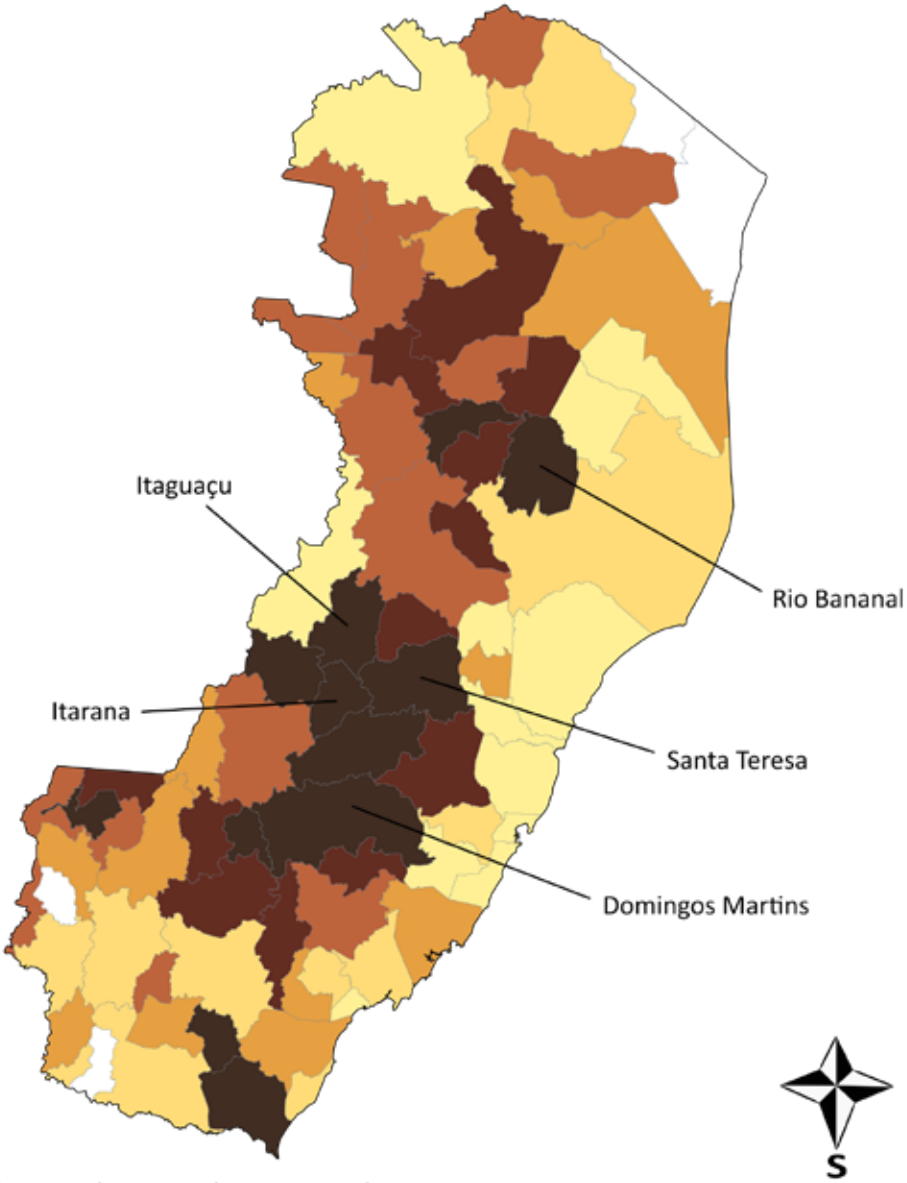
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP


MINAS GERAIS POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Serra do Salitre
Gurinhatã
Luz
Itamogi
Ibitiúra de Minas
S
Cases in relation to the population in the municipality
(1:100,000 residents)
58.90 - 309.60
33.65 - 58.89
19.79 - 33.64
12.40 - 19.78
5.75 - 12.39
0.38 - 5.74
Without information
0 80 160 240
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

ESPÍRITO SANTO **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

- 127.95 - 393.61
- 81.70 - 127.94
- 35.37 - 81.69
- 16.79 - 35.36
- 7.37 - 16.78
- 1.54 - 7.36
- Without information

0 25 50 75 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

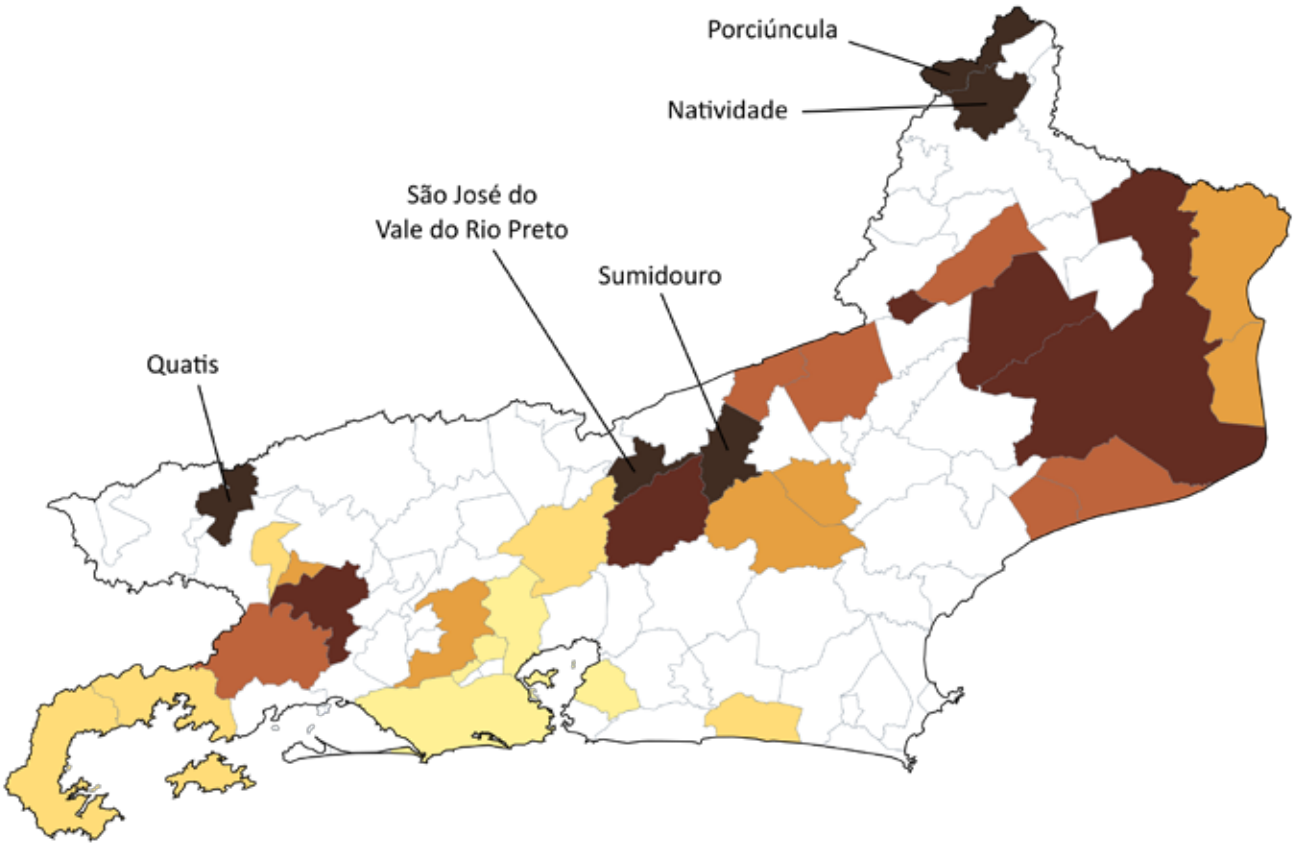
Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

RIO DE JANEIRO **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

- 15.63 - 73.83
- 7.60 - 15.62
- 4.94 - 7.59
- 2.76 - 4.93
- 0.78 - 2.75
- 0.06 - 0.77
- Without information

S

0 25 50 75 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

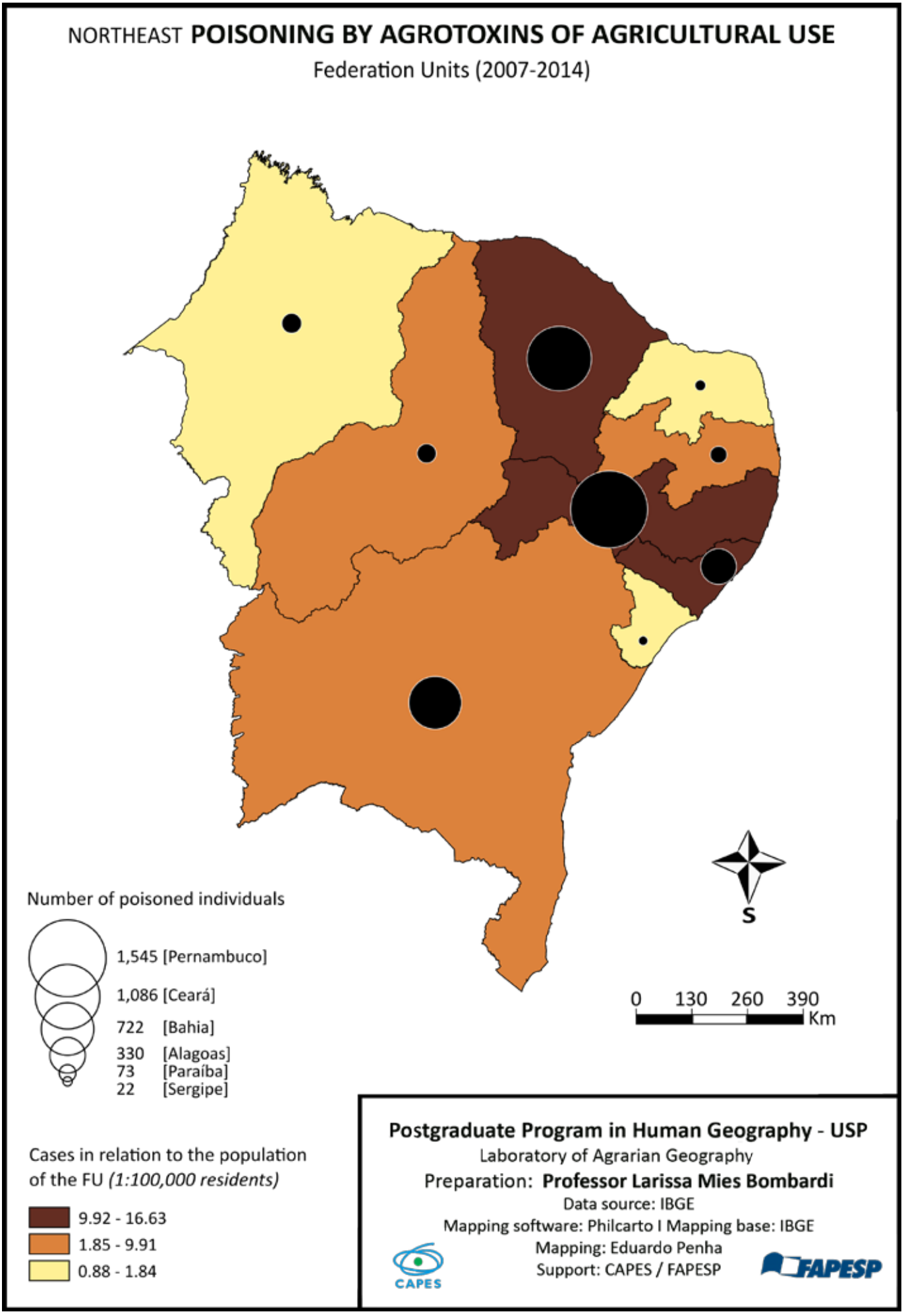
Data source: IBGE

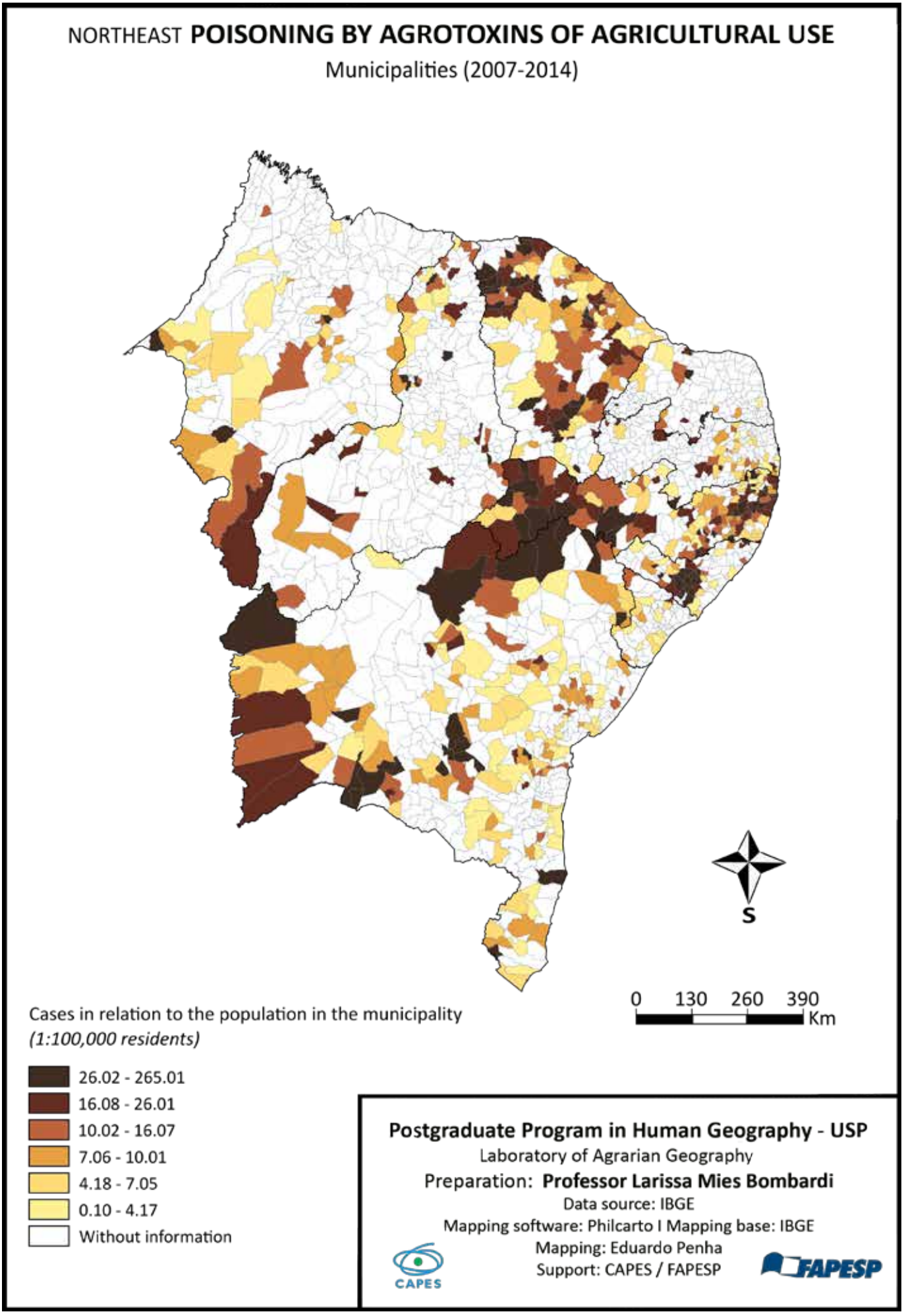
Mapping software: Philcarto I Mapping base: IBGE

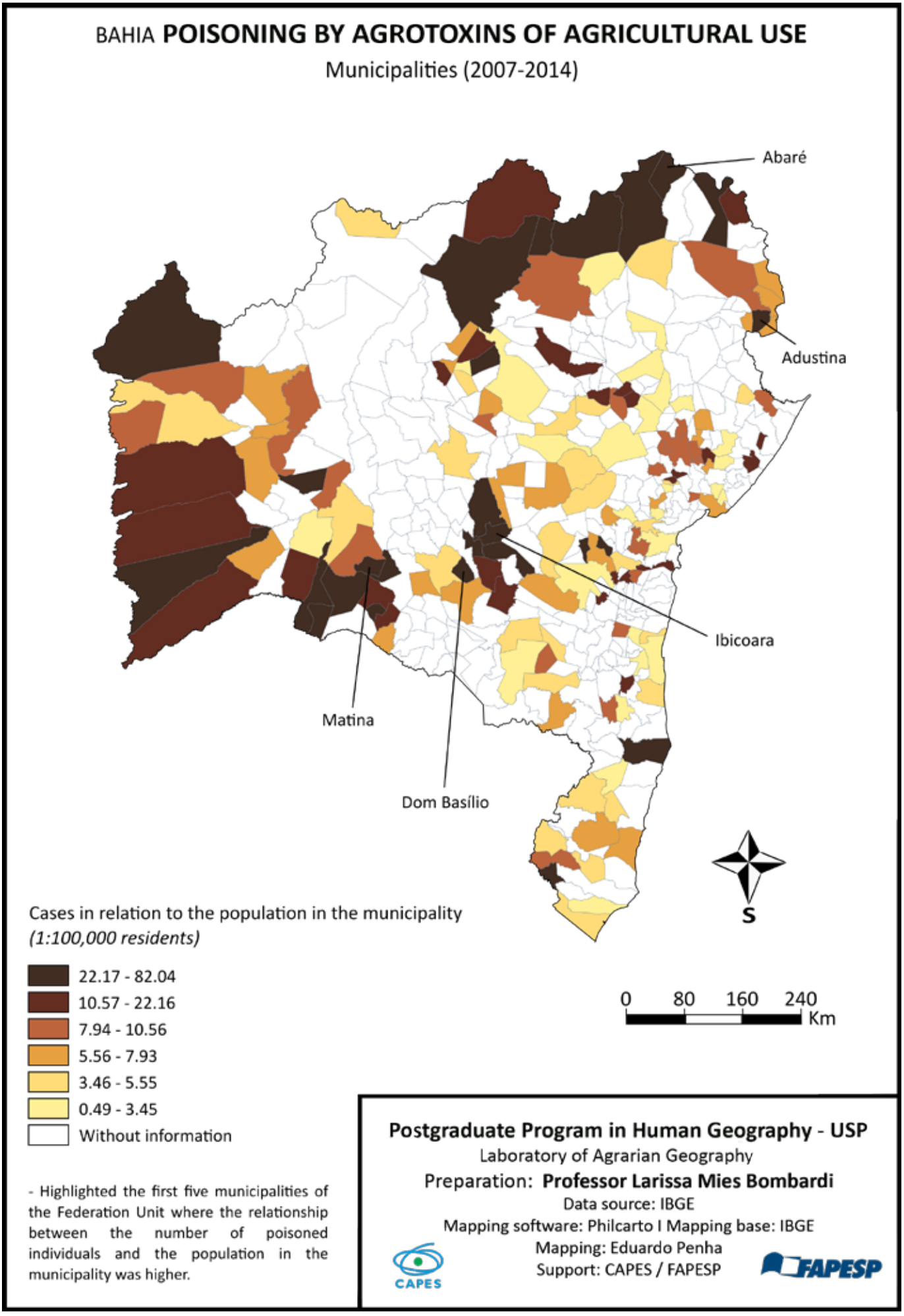
Mapping: Eduardo Penha

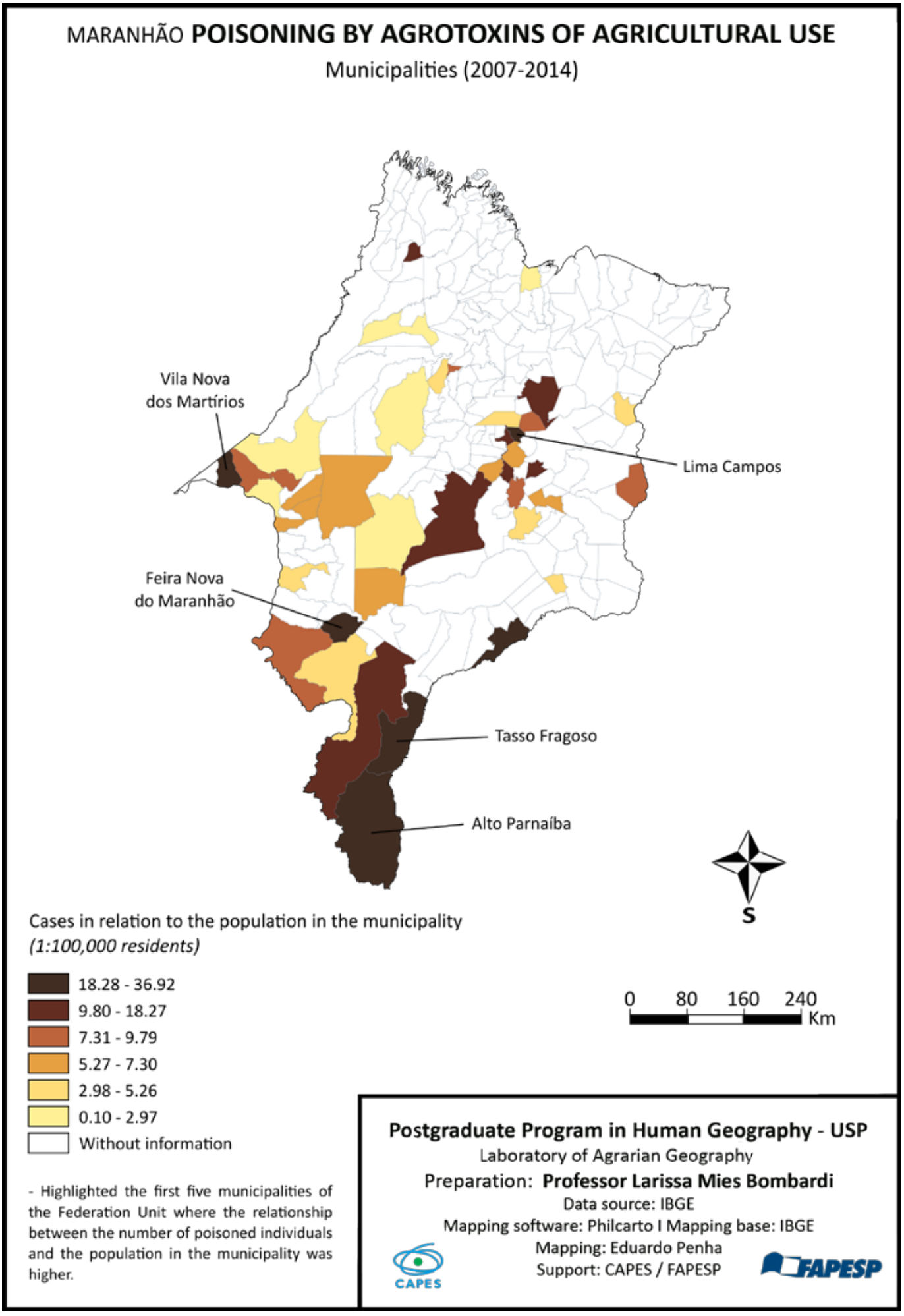
Support: CAPES / FAPESP

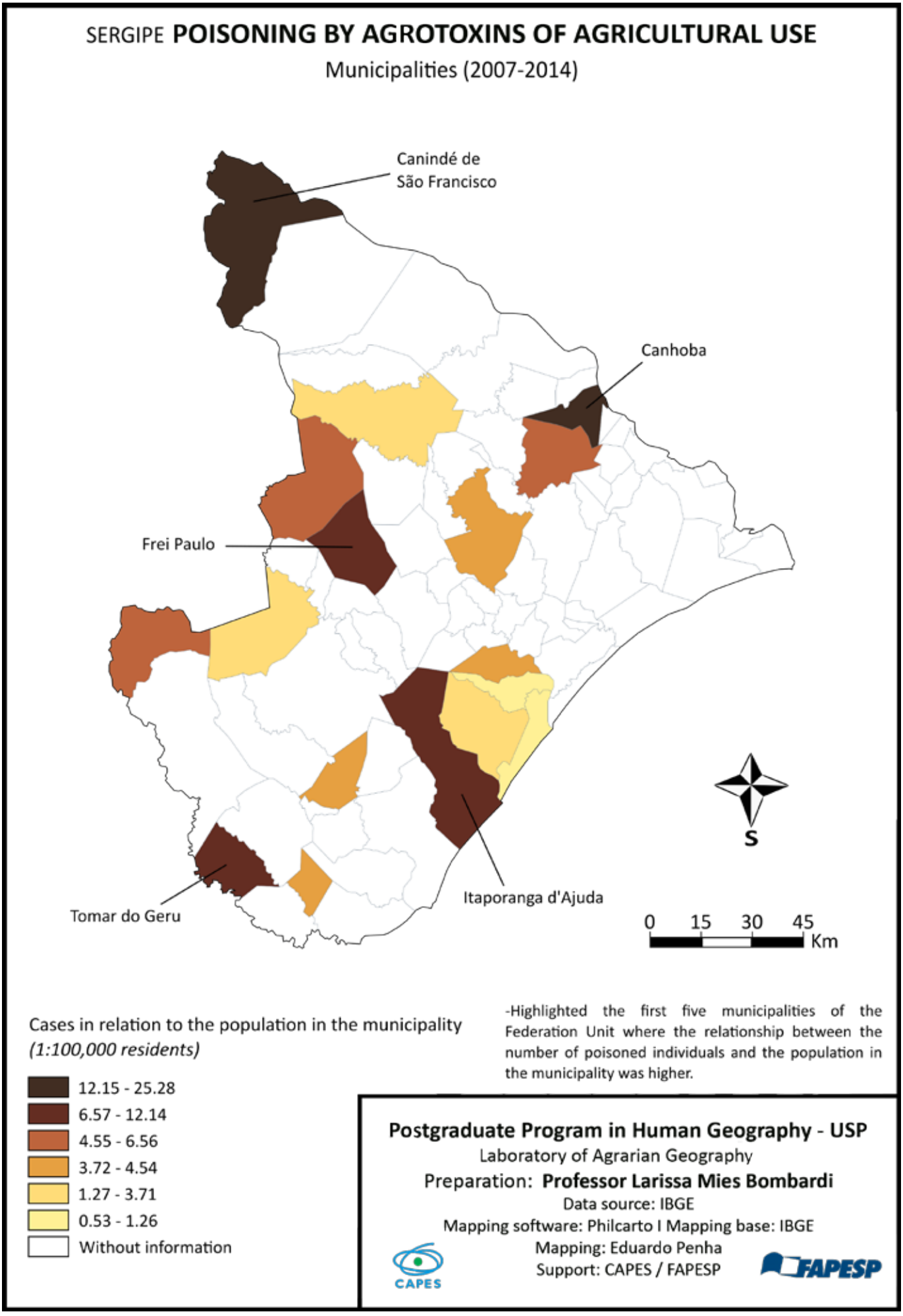
NORTHEAST **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

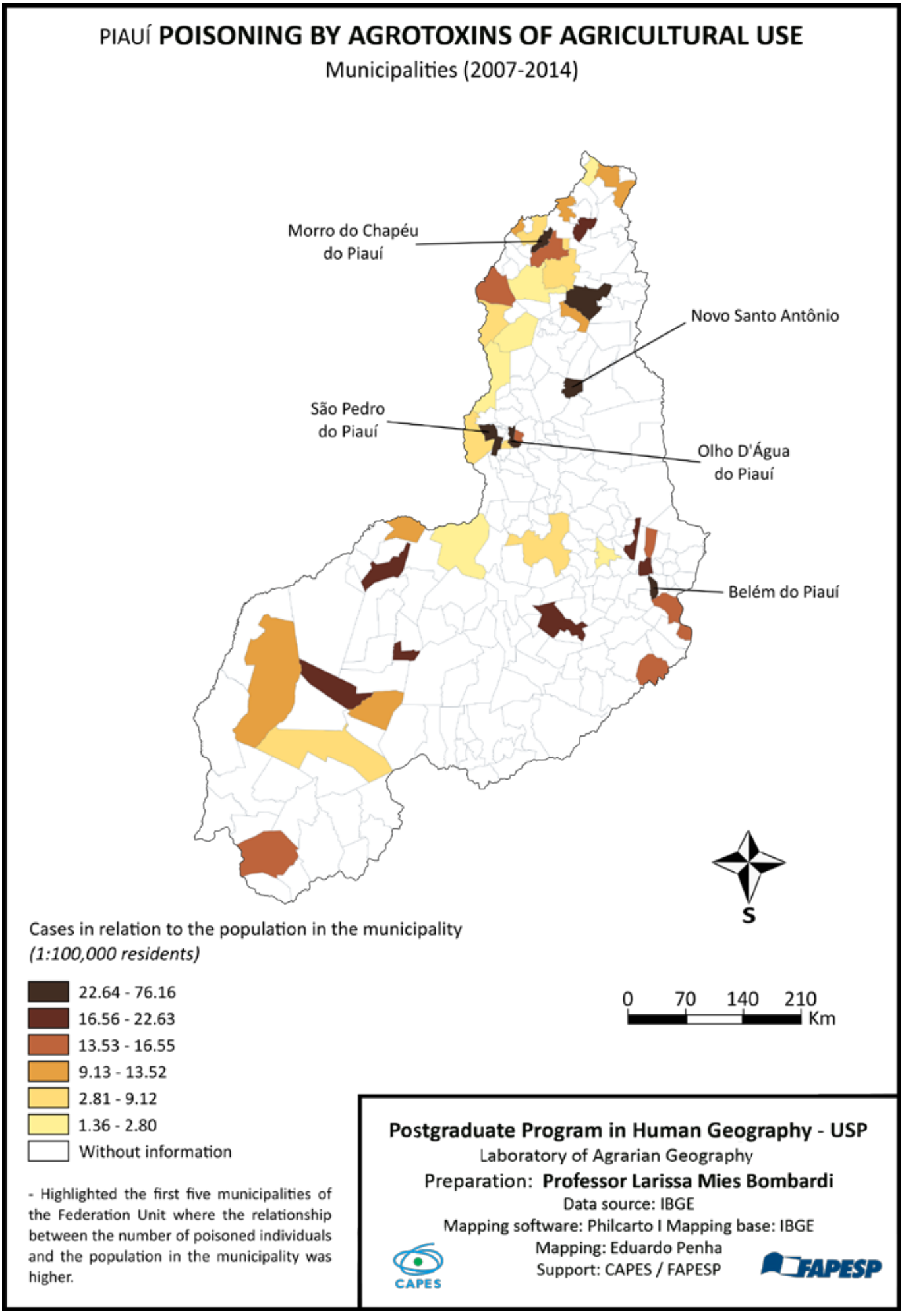

NORTHEAST POISONING BY AGROTOXINS OF AGRICULTURAL USE
Federation Units (2007-2014)
Number of poisoned individuals
1,545 [Pernambuco]
1,086 [Ceará]
722 [Bahia]
330 [Alagoas]
73 [Paraíba]
22 [Sergipe]
S
0 130 260 390
Km
Cases in relation to the population of the FU (1:100,000 residents)
9.92 - 16.63
1.85 - 9.91
0.88 - 1.84
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


NORTHEAST POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
S
0 130 260 390
Km
Cases in relation to the population in the municipality
(1:100,000 residents)
26.02 - 265.01
16.08 - 26.01
10.02 - 16.07
7.06 - 10.01
4.18 - 7.05
0.10 - 4.17
Without information
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BAHIA POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Abaré
Adustina
Ibicoara
Matina
Dom Basílio
S
Cases in relation to the population in the municipality
(1:100,000 residents)
22.17 - 82.04
10.57 - 22.16
7.94 - 10.56
5.56 - 7.93
3.46 - 5.55
0.49 - 3.45
Without information
0 80 160 240
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

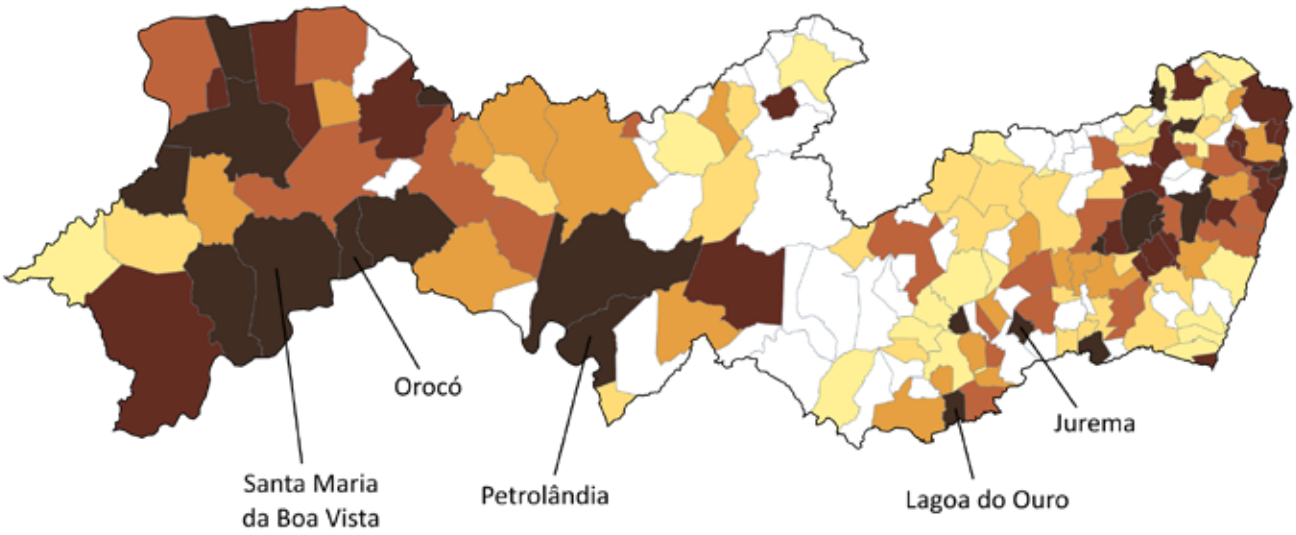

MARANHÃO POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Vila Nova dos Martírios
Lima Campos
Feira Nova do Maranhão
Tasso Fragoso
Alto Parnaíba
S
Cases in relation to the population in the municipality
(1:100,000 residents)
18.28 - 36.92
9.80 - 18.27
7.31 - 9.79
5.27 - 7.30
2.98 - 5.26
0.10 - 2.97
Without information
0 80 160 240
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


SERGIPE POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Canindé de São Francisco
Canhoba
Frei Paulo
Itaporanga d'Ajuda
Tomar do Geru
S
0 15 30 45
Km
Cases in relation to the population in the municipality
(1:100,000 residents)
12.15 - 25.28
6.57 - 12.14
4.55 - 6.56
3.72 - 4.54
1.27 - 3.71
0.53 - 1.26
Without information
-Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


PIAUÍ POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Morro do Chapéu do Piauí
Novo Santo Antônio
São Pedro do Piauí
Olho D'Água do Piauí
Belém do Piauí
S
Cases in relation to the population in the municipality
(1:100,000 residents)
22.64 - 76.16
16.56 - 22.63
13.53 - 16.55
9.13 - 13.52
2.81 - 9.12
1.36 - 2.80
Without information
0 70 140 210
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

PERNAMBUCO **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

- 28.96 - 189.58
- 20.96 - 28.95
- 15.23 - 20.95
- 9.68 - 15.22
- 5.70 - 9.67
- 2.28 - 5.69
- Without information

S

0 50 100 150 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

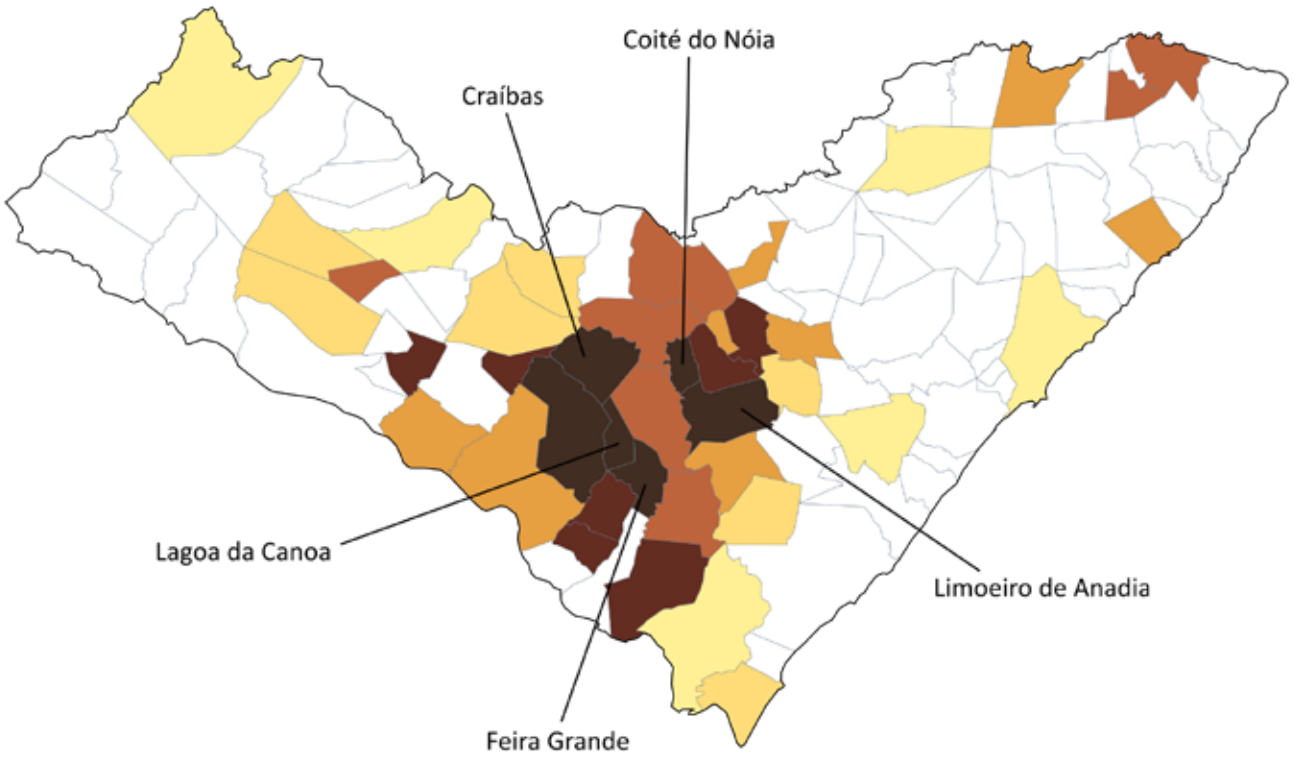
Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

ALAGOAS **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

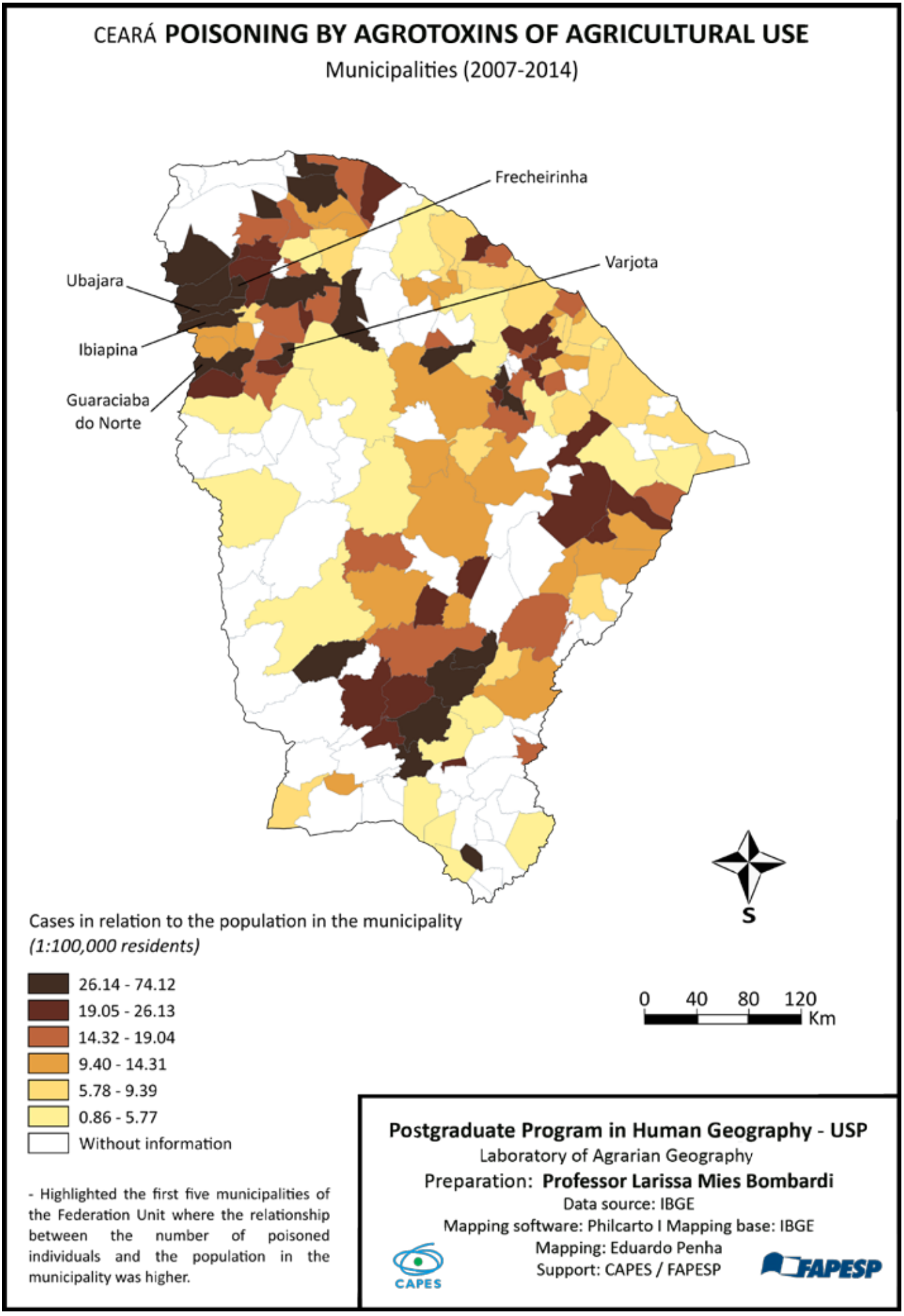
- 57.38 - 265.01
- 34.35 - 57.37
- 22.74 - 34.34
- 9.99 - 22.73
- 4.86 - 9.98
- 0.11 - 4.85
- Without information

S

0 20 40 60 Km

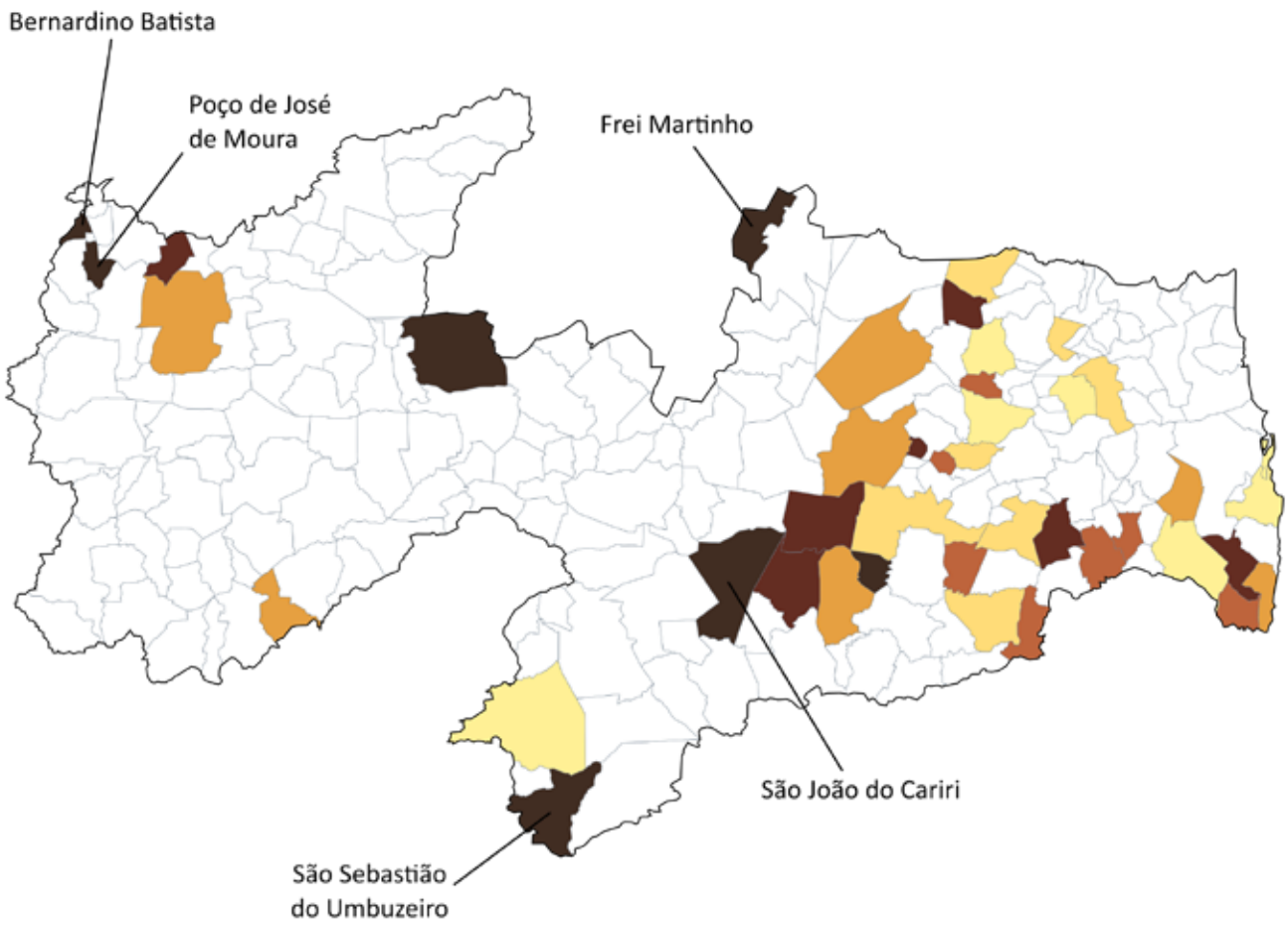
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP


CEARÁ POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Frecheirinha
Varjota
Ubajara
Ibiapina
Guaraciaba do Norte
S
Cases in relation to the population in the municipality
(1:100,000 residents)
26.14 - 74.12
19.05 - 26.13
14.32 - 19.04
9.40 - 14.31
5.78 - 9.39
0.86 - 5.77
Without information
0 40 80 120
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

PARAÍBA **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

- 21.01 - 34.09
- 11.94 - 21.00
- 7.90 - 11.93
- 5.87 - 7.89
- 5.08 - 5.86
- 0.41 - 5.07
- Without information

S

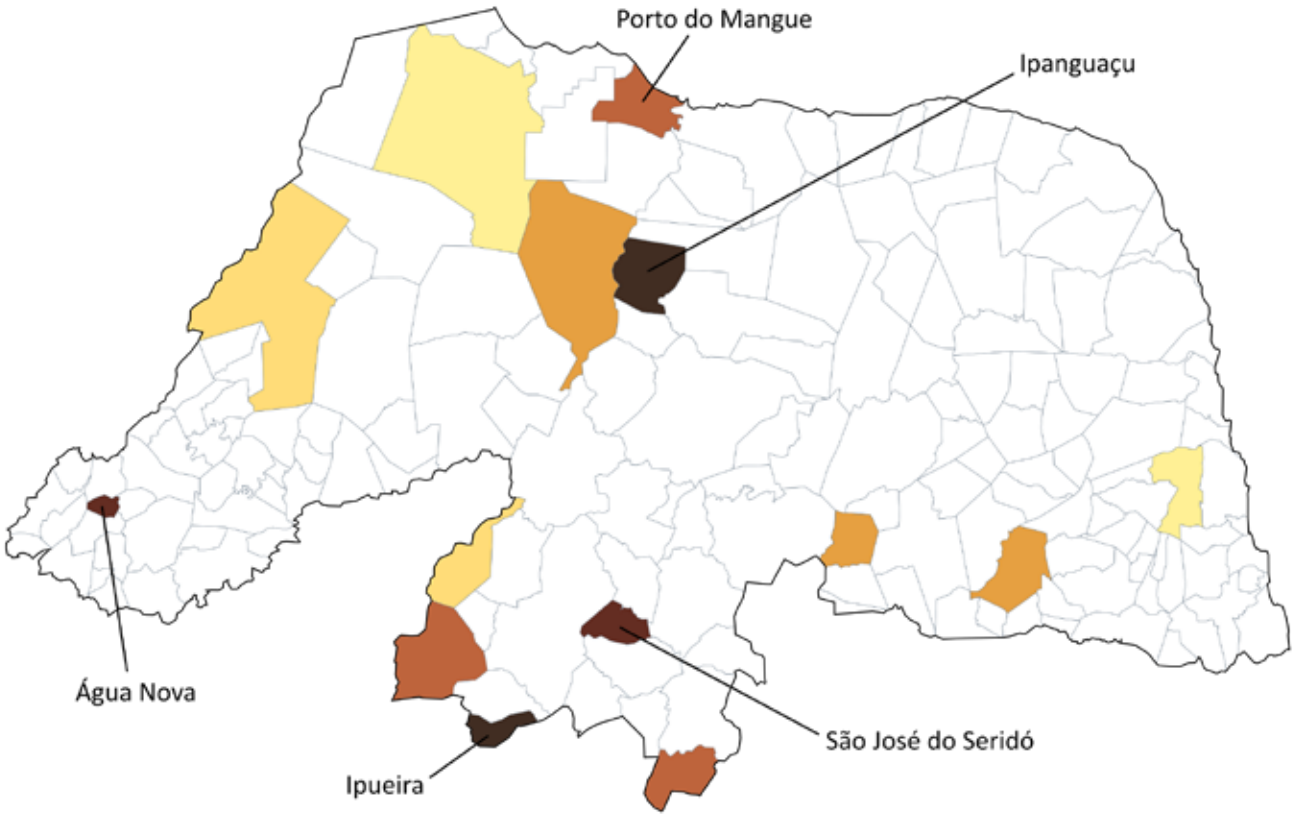
0 30 60 90 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

RIO GRANDE DO NORTE **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

- 43.30 - 48.15
- 23.64 - 43.29
- 12.87 - 23.63
- 8.09 - 12.86
- 5.75 - 8.08
- 2.51 - 5.74
- Without information

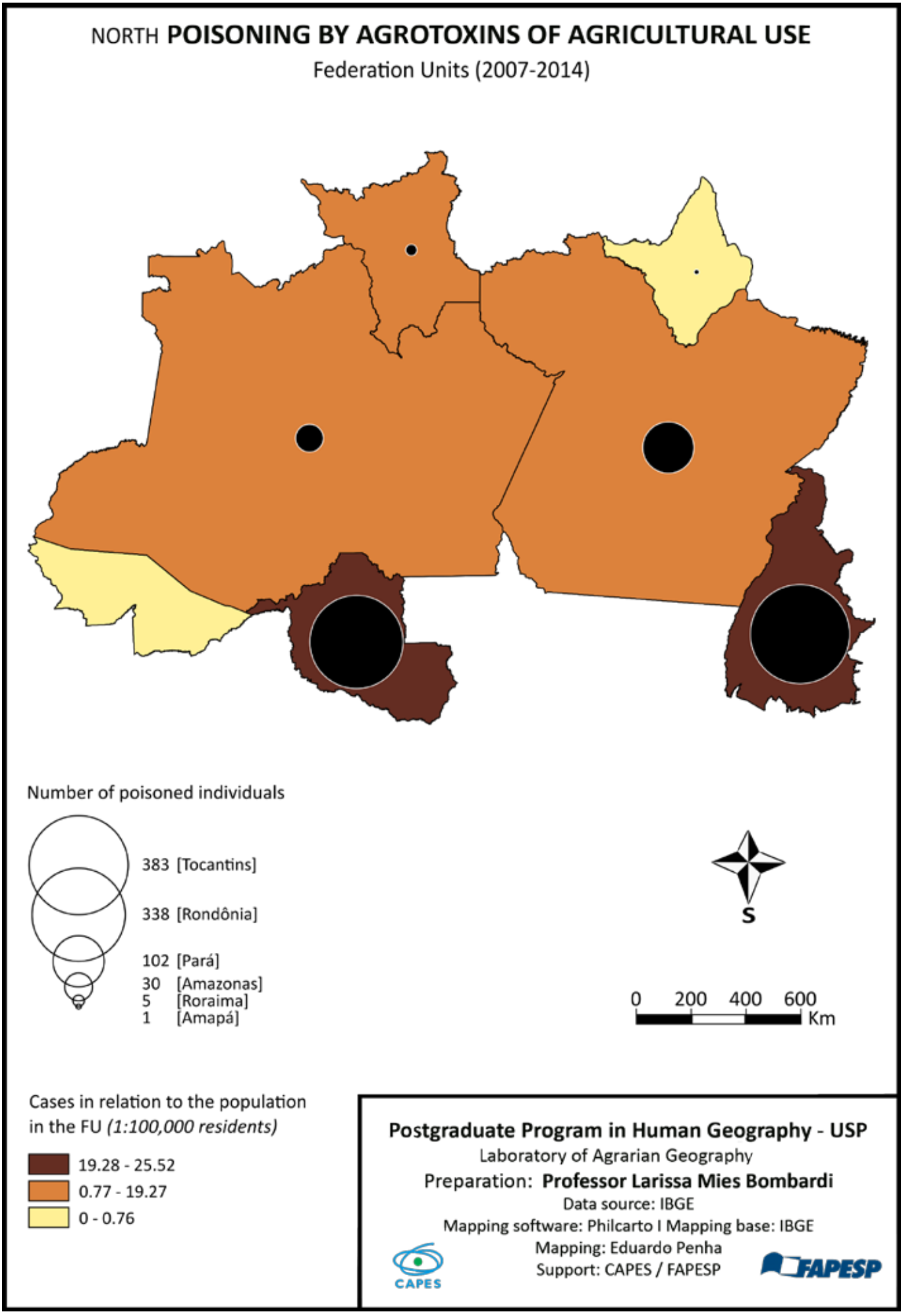
S

0 25 50 75 Km

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

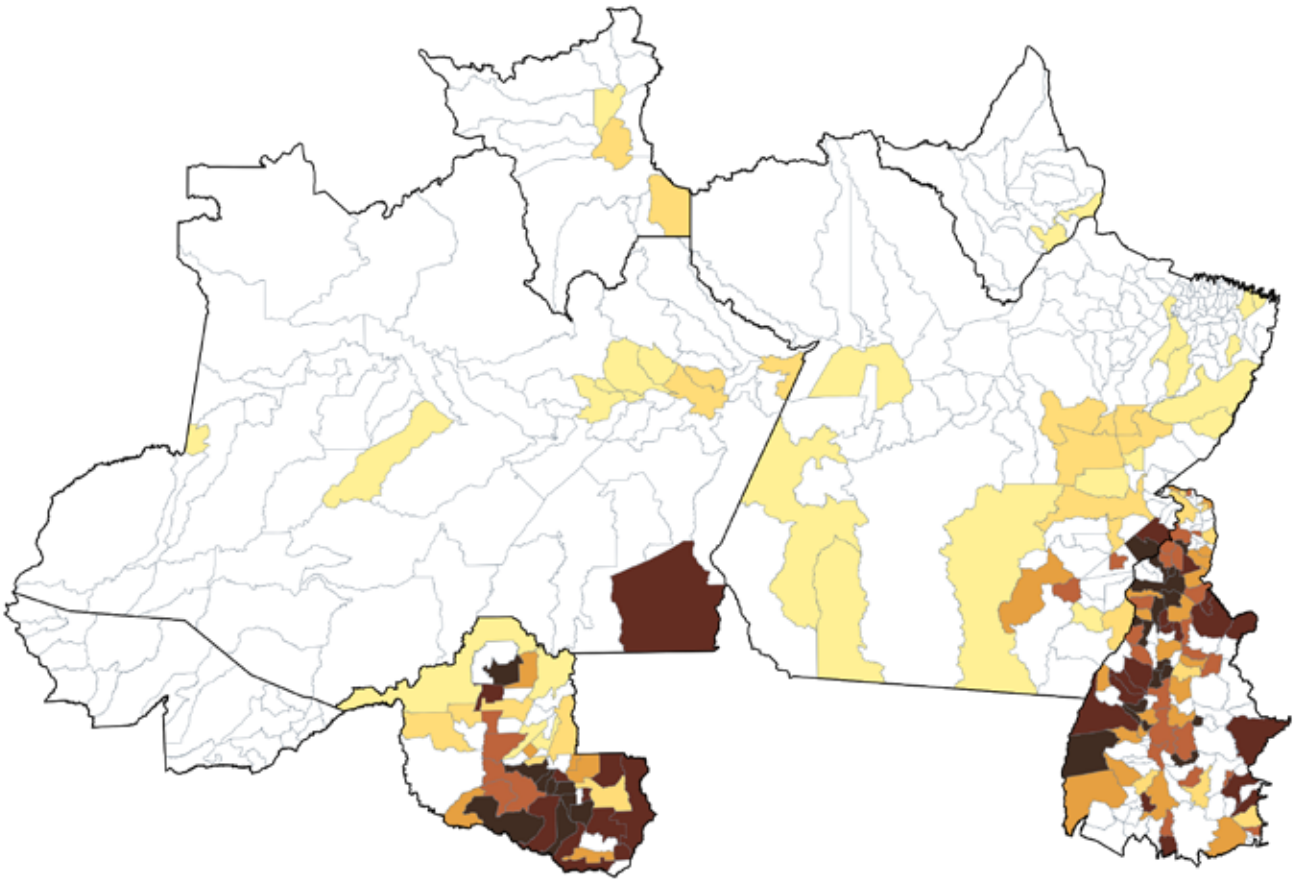
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

NORTH **POISONING BY AGROTOXINS OF AGRICULTURAL USE**


NORTH POISONING BY AGROTOXINS OF AGRICULTURAL USE
Federation Units (2007-2014)
Number of poisoned individuals
383 [Tocantins]
338 [Rondônia]
102 [Pará]
30 [Amazonas]
5 [Roraima]
1 [Amapá]
S
0 200 400 600
Km
Cases in relation to the population in the FU (1:100,000 residents)
19.28 - 25.52
0.77 - 19.27
0 - 0.76
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

NORTH **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population of the municipality
(1:100,000 residents)

- 63.79 - 190.89
- 40.88 - 63.78
- 27.11 - 40.87
- 13.35 - 27.10
- 4.44 - 13.34
- 0.07 - 4.43
- Without information

S

0 200 400 600 Km

- Out of the 860 poisoning cases, 1 (0.12%) disregard the municipality and is not represented in this map.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

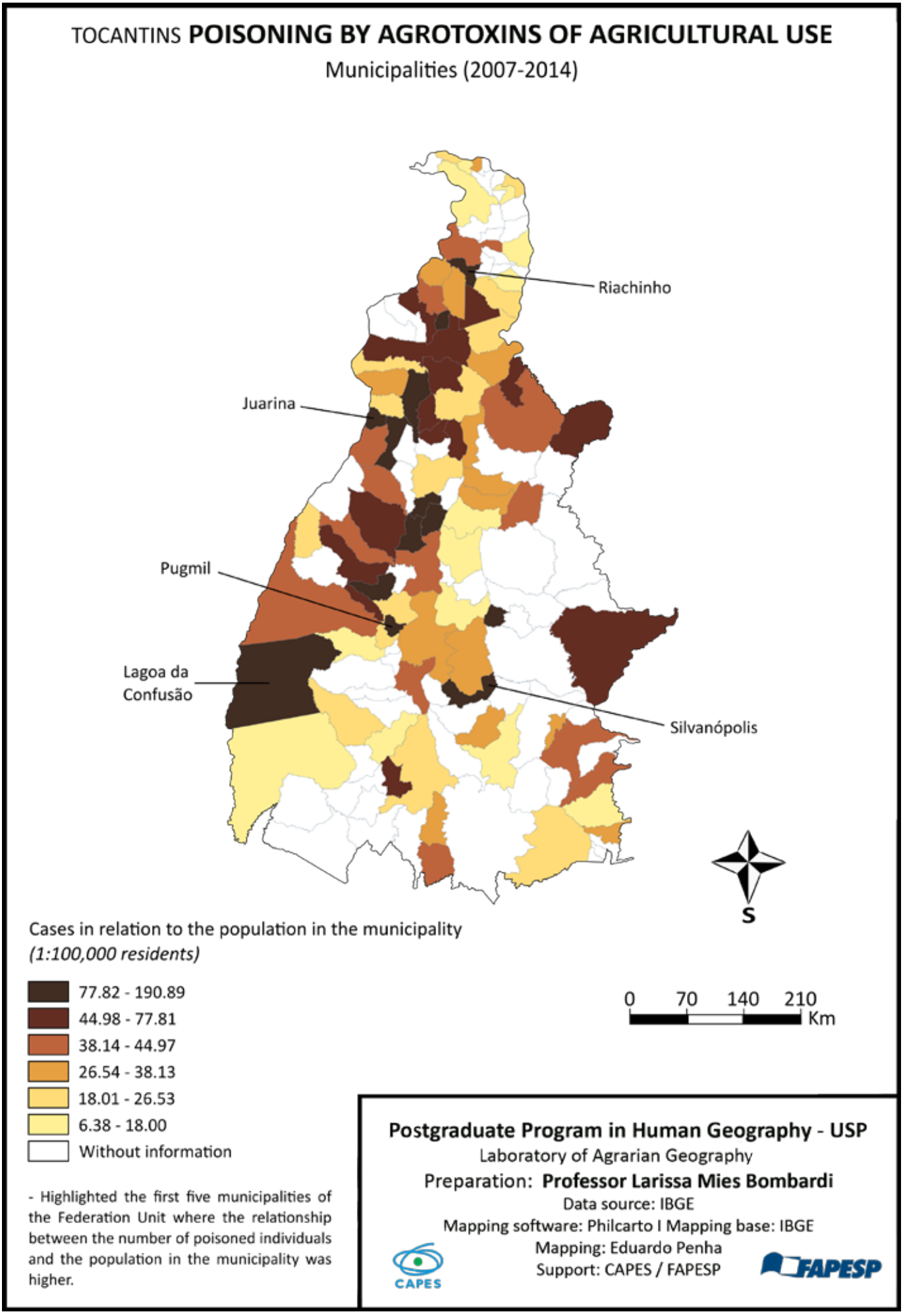
Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

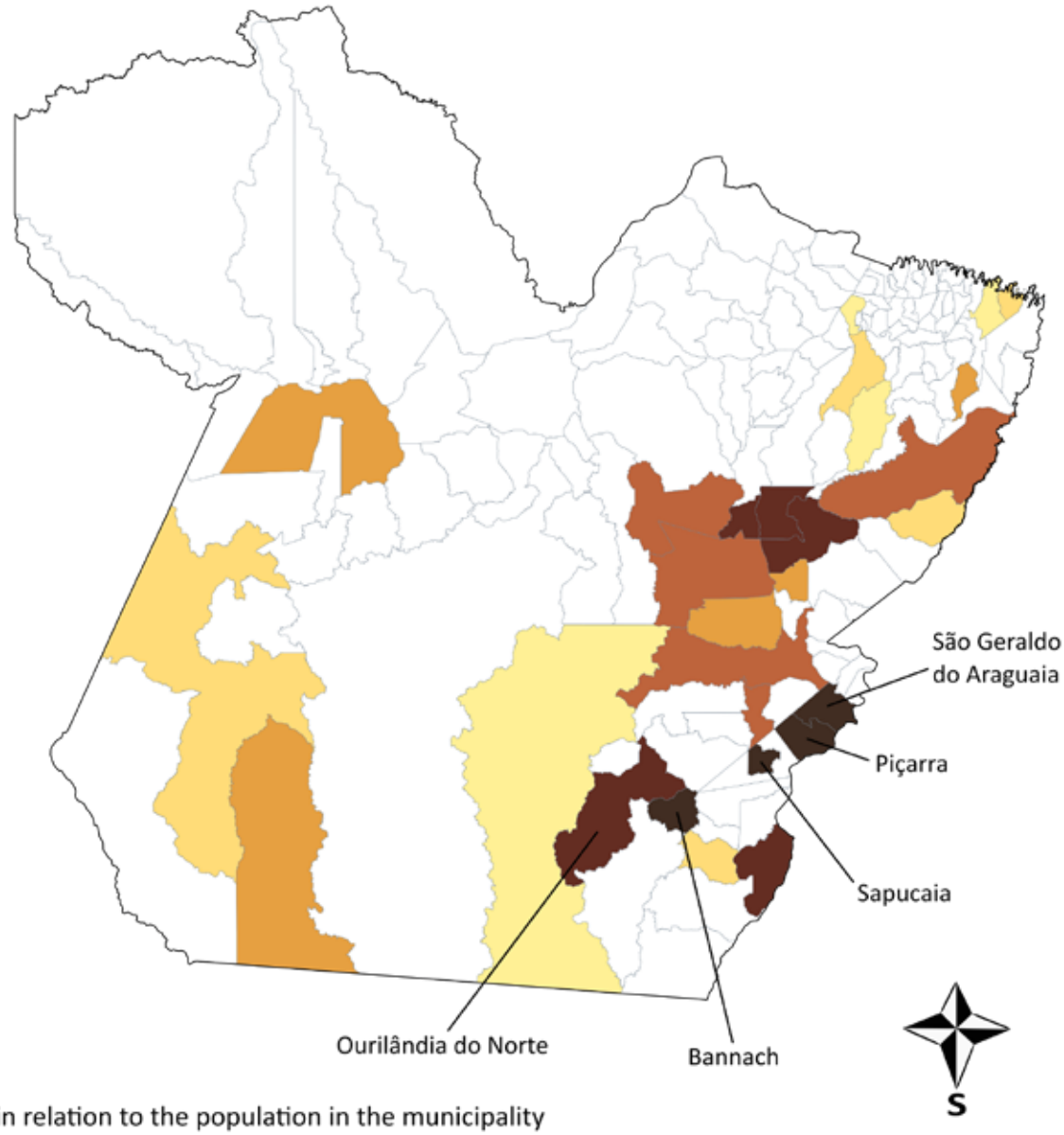
Support: CAPES / FAPESP

CAPES FAPESP


TOCANTINS POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Riachinho
Juarina
Pugmil
Lagoa da Confusão
Silvanópolis
S
Cases in relation to the population in the municipality
(1:100,000 residents)
77.82 - 190.89
44.98 - 77.81
38.14 - 44.97
26.54 - 38.13
18.01 - 26.53
6.38 - 18.00
Without information
0 70 140 210
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

PARÁ **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



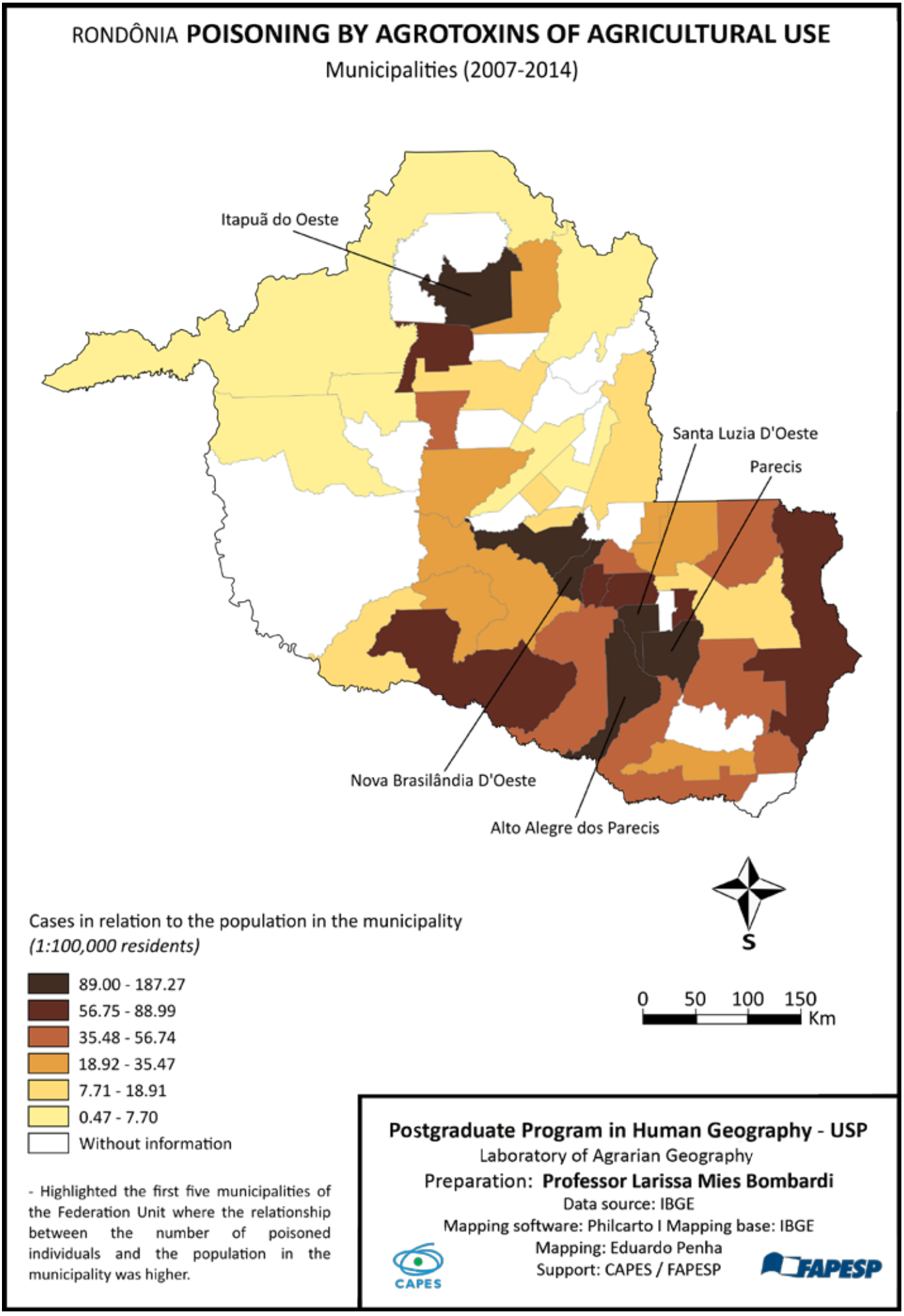
Cases in relation to the population in the municipality
(1:100,000 residents)

- 29.15 - 102.39
- 6.59 - 29.14
- 4.09 - 6.58
- 3.73 - 4.08
- 1.87 - 3.72
- 0.07 - 1.86
- Without information

- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.

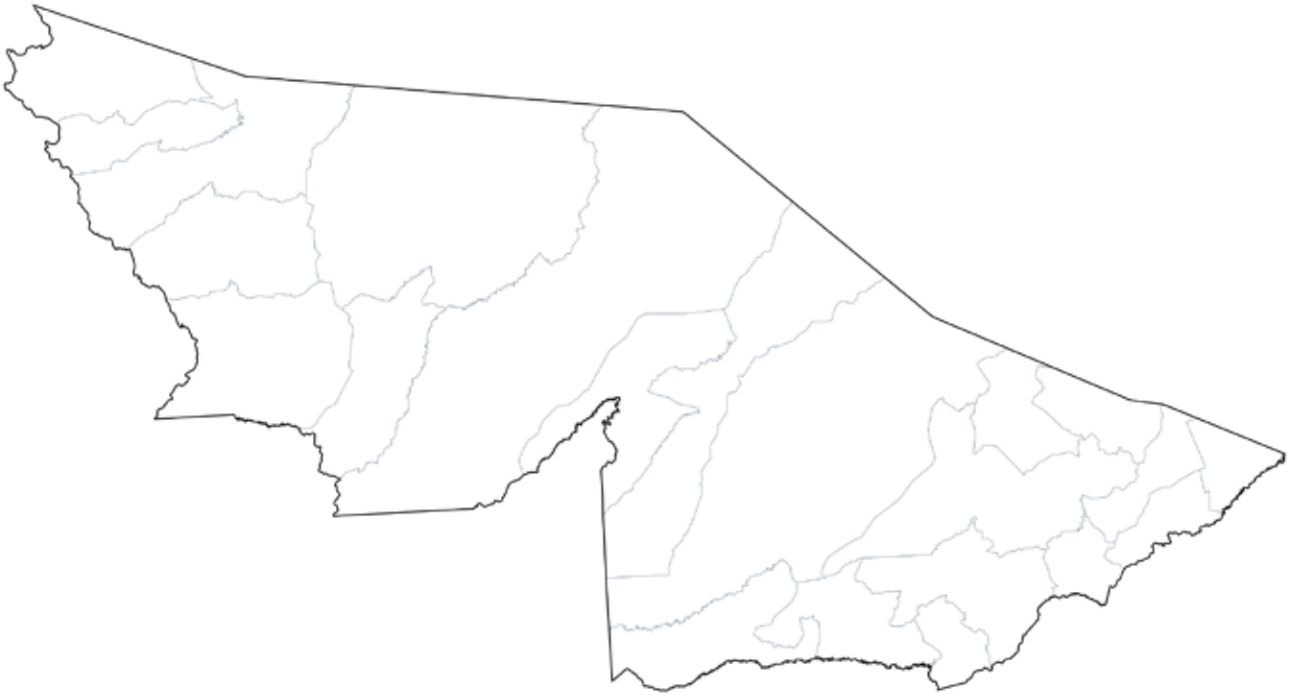
0 110 220 330 Km

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP


RONDÔNIA POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Itapuã do Oeste
Santa Luzia D'Oeste
Parecis
Nova Brasilândia D'Oeste
Alto Alegre dos Parecis
S
Cases in relation to the population in the municipality
(1:100,000 residents)
89.00 - 187.27
56.75 - 88.99
35.48 - 56.74
18.92 - 35.47
7.71 - 18.91
0.47 - 7.70
Without information
0 50 100 150
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

ACRE **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

Municipalities (2007-2014)



Cases in relation to the population in the municipality
(1:100,000 residents)

Without information

S

0 50 100 150 Km

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

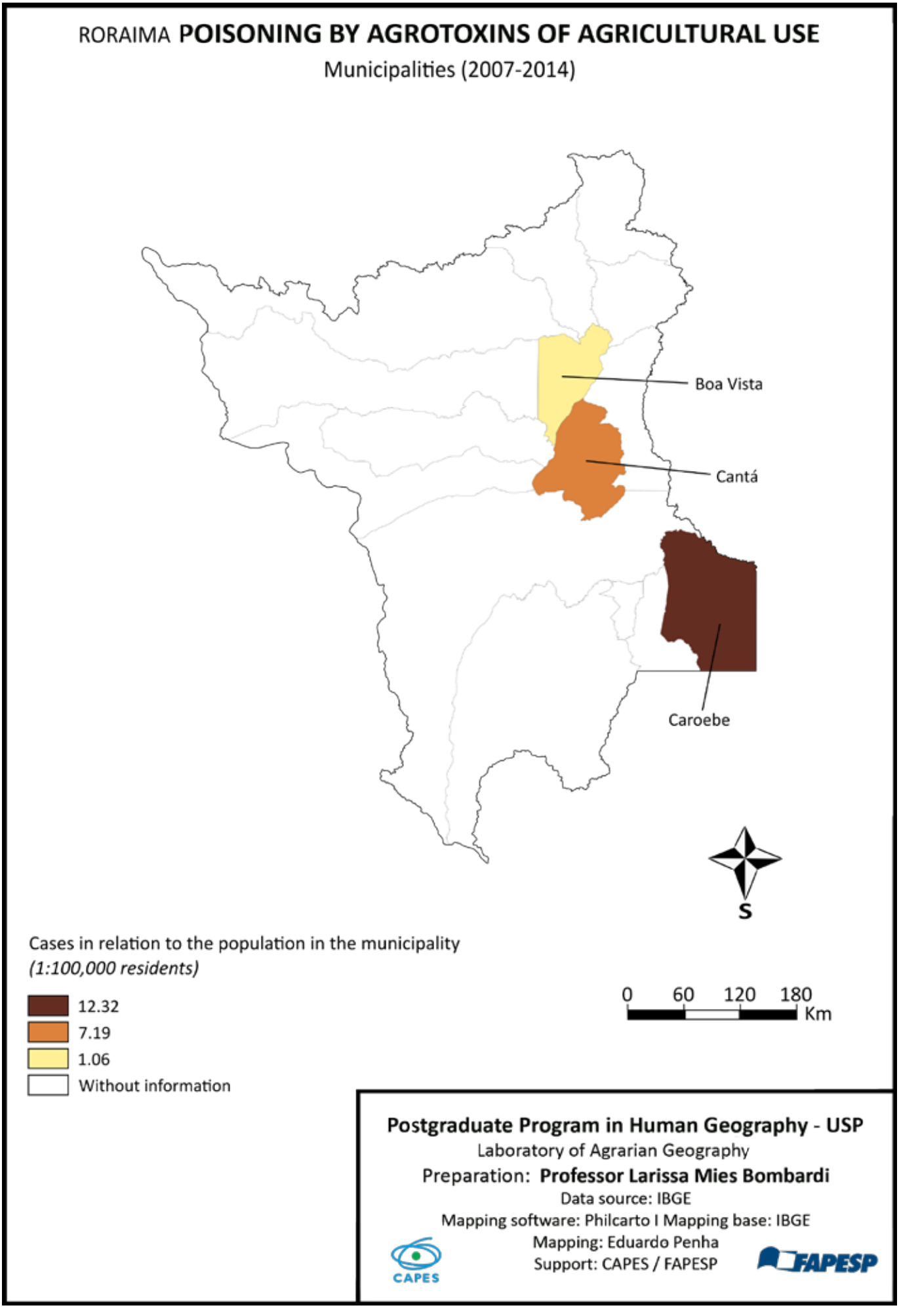
Preparation: **Professor Larissa Mies Bombardi**

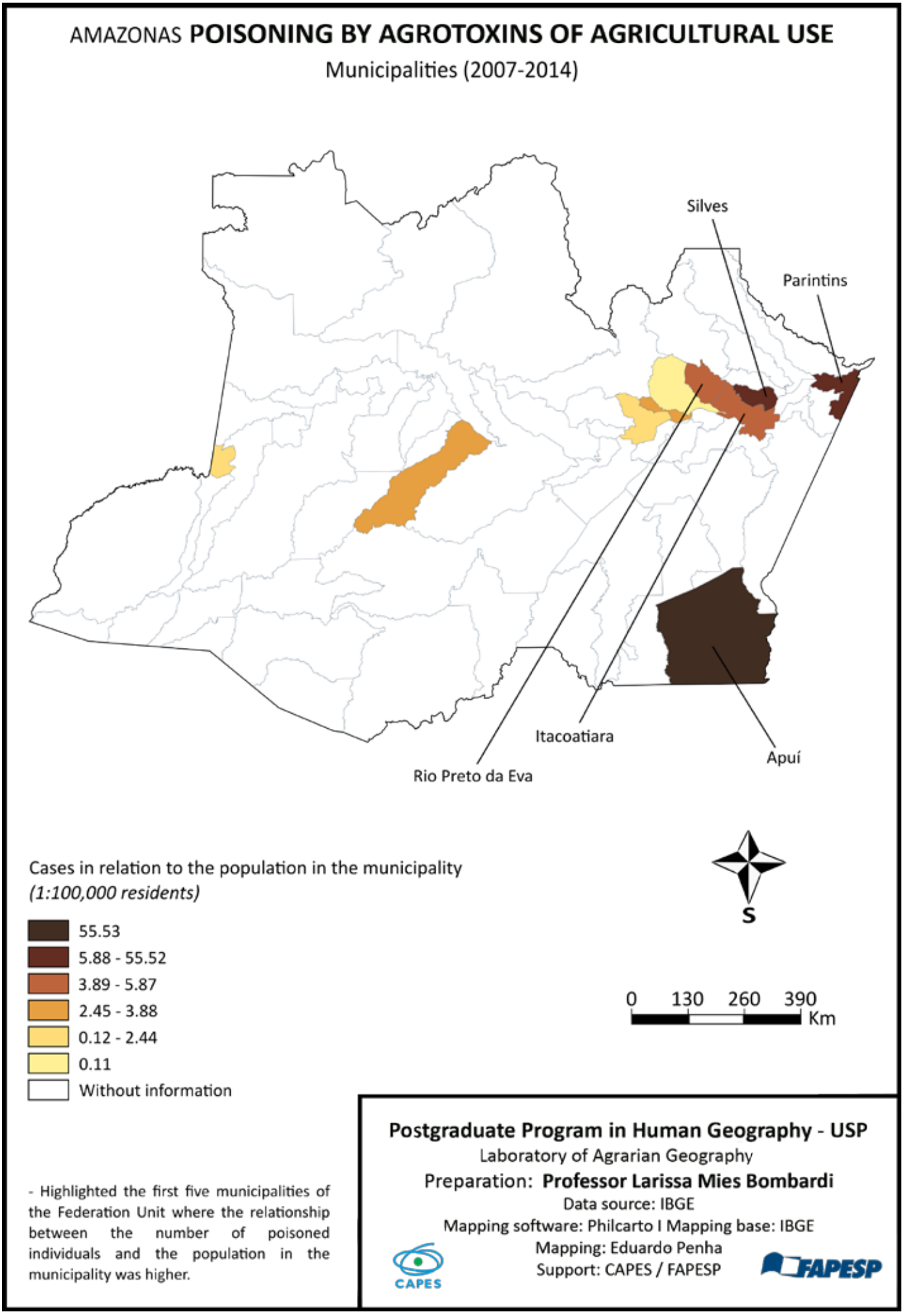
Data source: IBGE

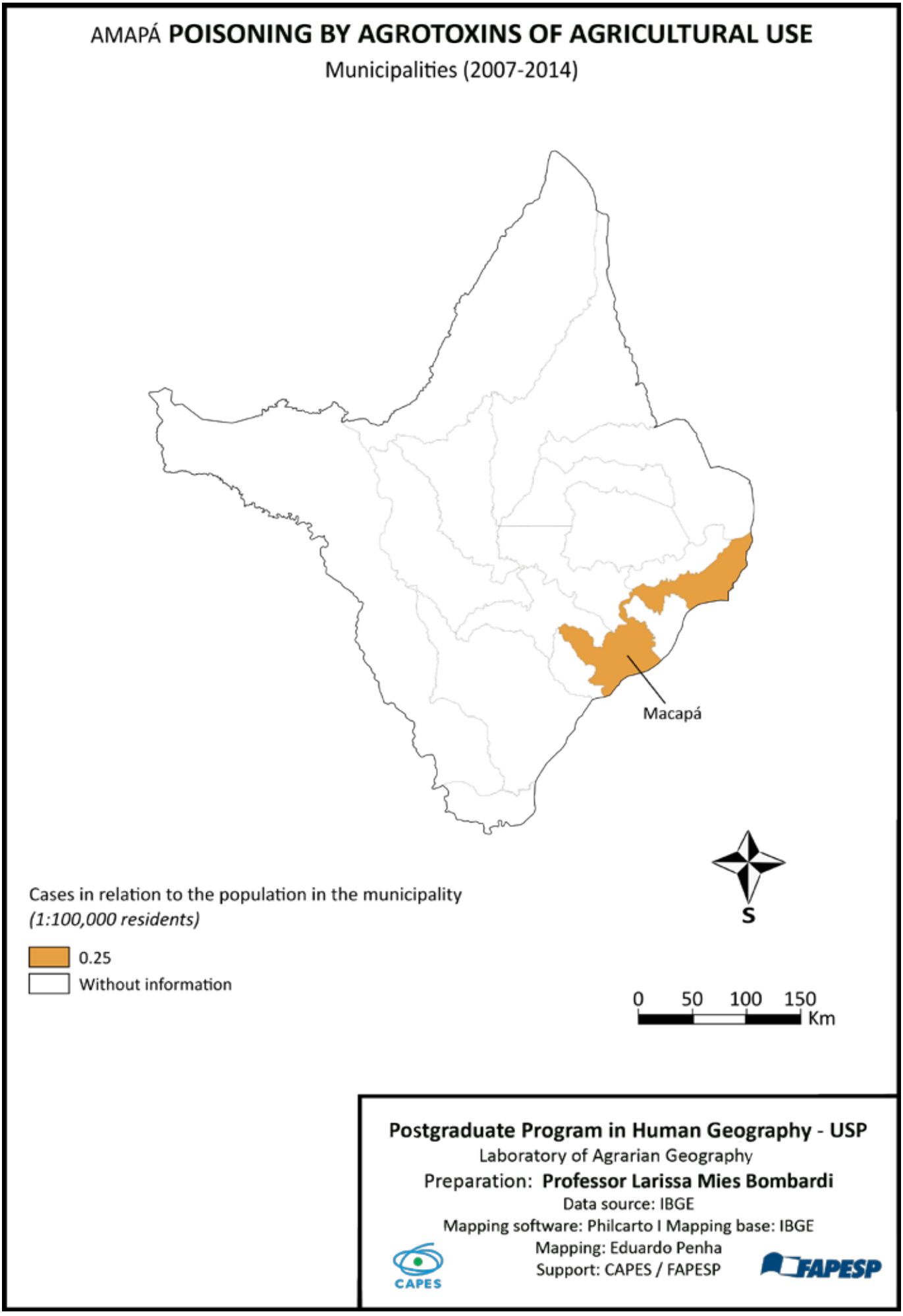
Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

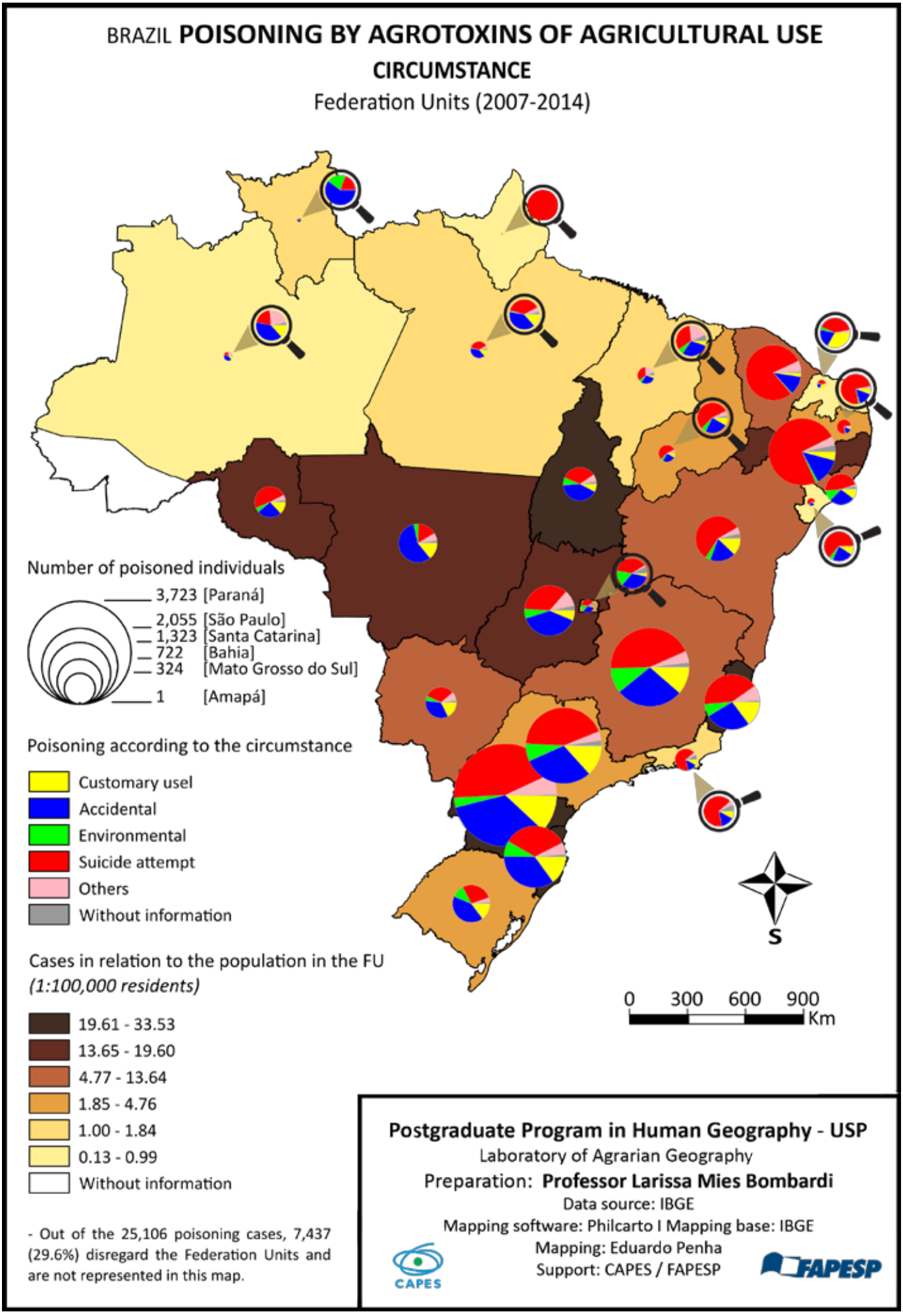

RORAIMA POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Boa Vista
Cantá
Caroebe
S
Cases in relation to the population in the municipality
(1:100,000 residents)
12.32
7.19
1.06
Without information
0 60 120 180
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

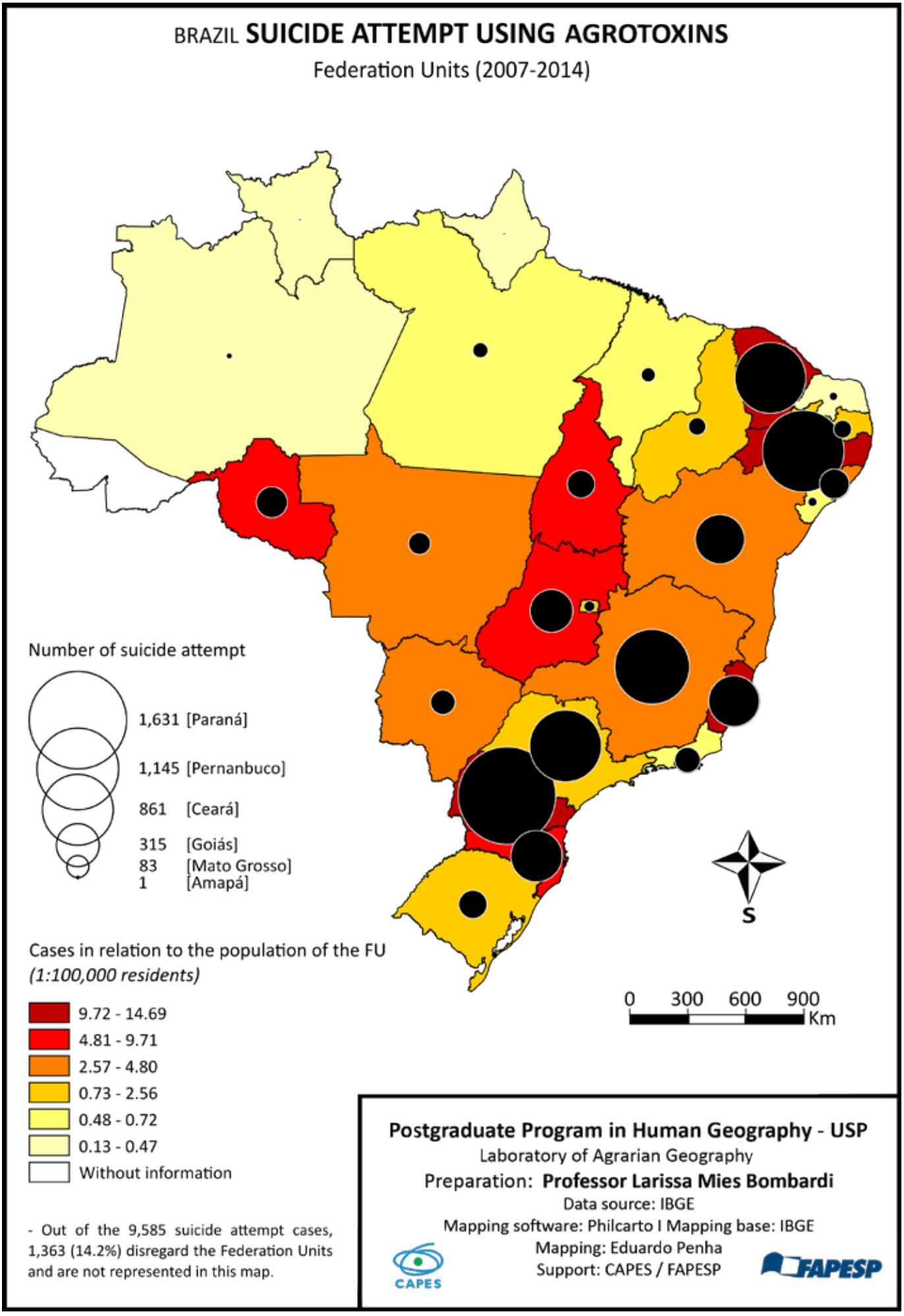

AMAZONAS POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Silves
Parintins
Itacoatiara
Apuí
Rio Preto da Eva
Cases in relation to the population in the municipality
(1:100,000 residents)
55.53
5.88 - 55.52
3.89 - 5.87
2.45 - 3.88
0.12 - 2.44
0.11
Without information
S
0 130 260 390
Km
- Highlighted the first five municipalities of the Federation Unit where the relationship between the number of poisoned individuals and the population in the municipality was higher.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

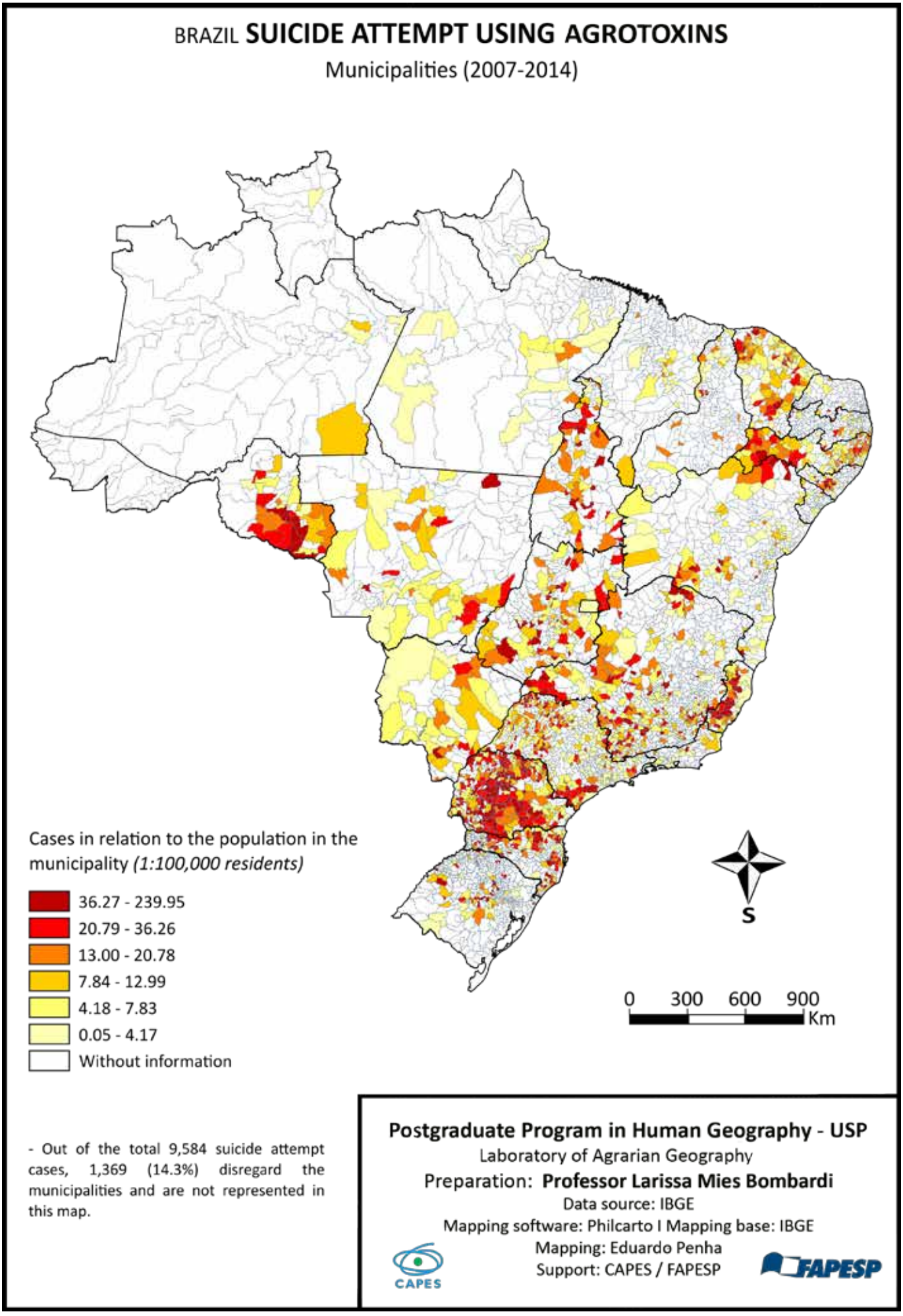

AMAPÁ POISONING BY AGROTOXINS OF AGRICULTURAL USE
Municipalities (2007-2014)
Macapá
S
Cases in relation to the population in the municipality
(1:100,000 residents)
0.25
Without information
0 50 100 150
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

BRAZIL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

CIRCUMSTANCE

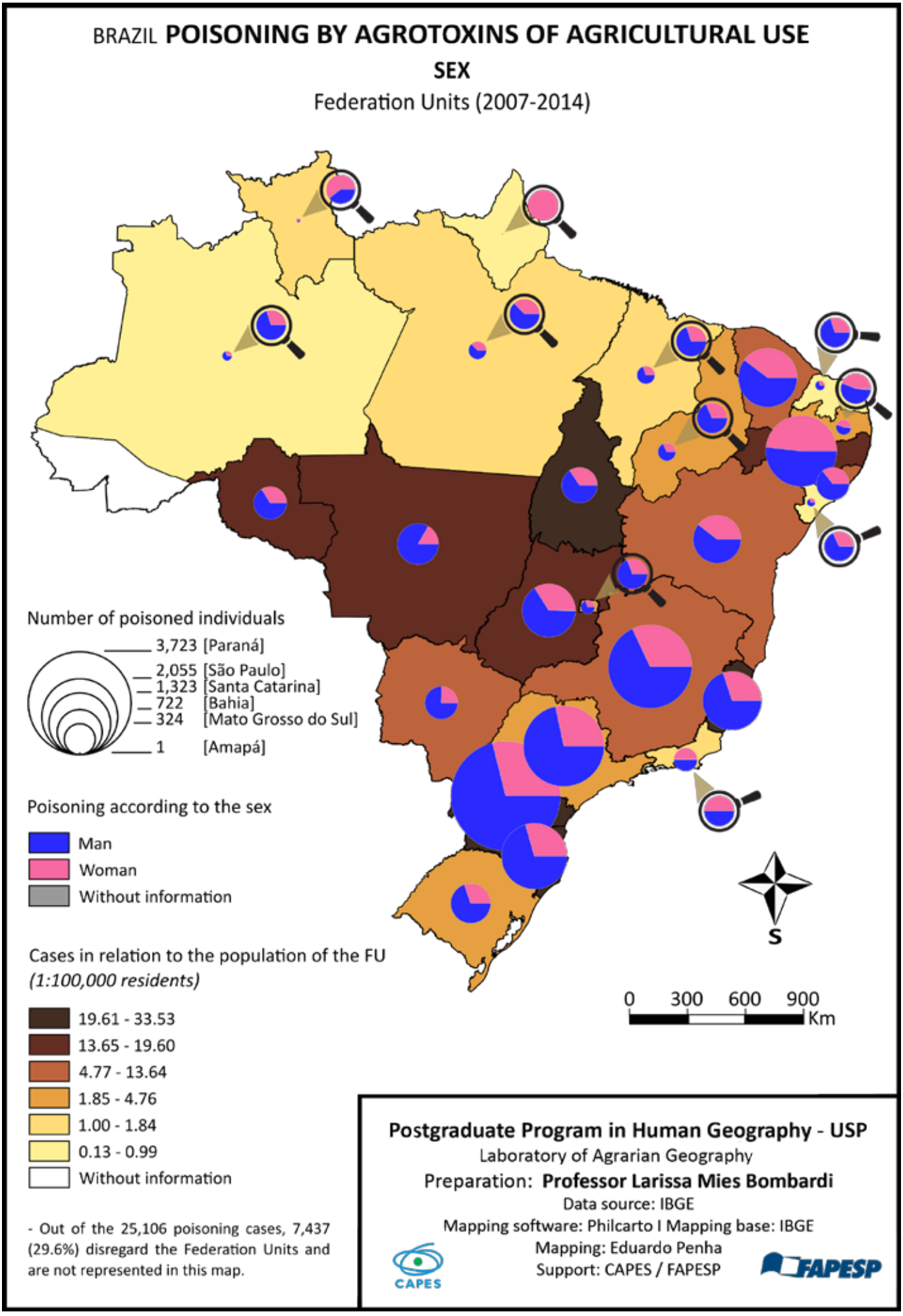

BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
CIRCUMSTANCE
Federation Units (2007-2014)
Number of poisoned individuals
3,723 [Paraná]
2,055 [São Paulo]
1,323 [Santa Catarina]
722 [Bahia]
324 [Mato Grosso do Sul]
1 [Amapá]
Poisoning according to the circumstance
Customary usel
Accidental
Environmental
Suicide attempt
Others
Without information
Cases in relation to the population in the FU
(1:100,000 residents)
19.61 - 33.53
13.65 - 19.60
4.77 - 13.64
1.85 - 4.76
1.00 - 1.84
0.13 - 0.99
Without information
- Out of the 25,106 poisoning cases, 7,437 (29.6%) disregard the Federation Units and are not represented in this map.
S
0 300 600 900
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

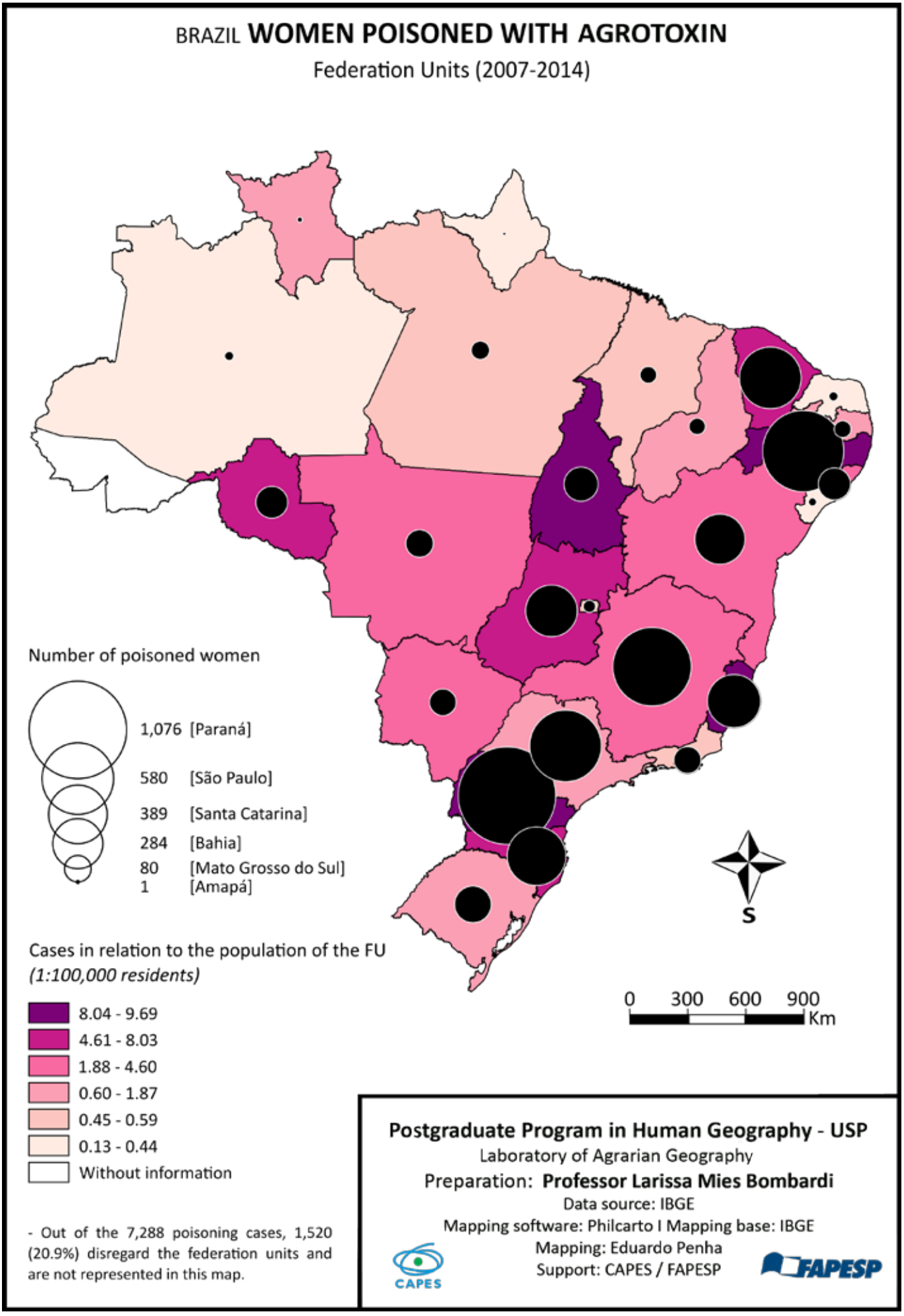

BRAZIL SUICIDE ATTEMPT USING AGROTOXINS
Federation Units (2007-2014)
Number of suicide attempt
1,631 [Paraná]
1,145 [Pernanbuco]
861 [Ceará]
315 [Goiás]
83 [Mato Grosso]
1 [Amapá]
S
Cases in relation to the population of the FU
(1:100,000 residents)
9.72 - 14.69
4.81 - 9.71
2.57 - 4.80
0.73 - 2.56
0.48 - 0.72
0.13 - 0.47
Without information
0 300 600 900
Km
- Out of the 9,585 suicide attempt cases, 1,363 (14.2%) disregard the Federation Units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

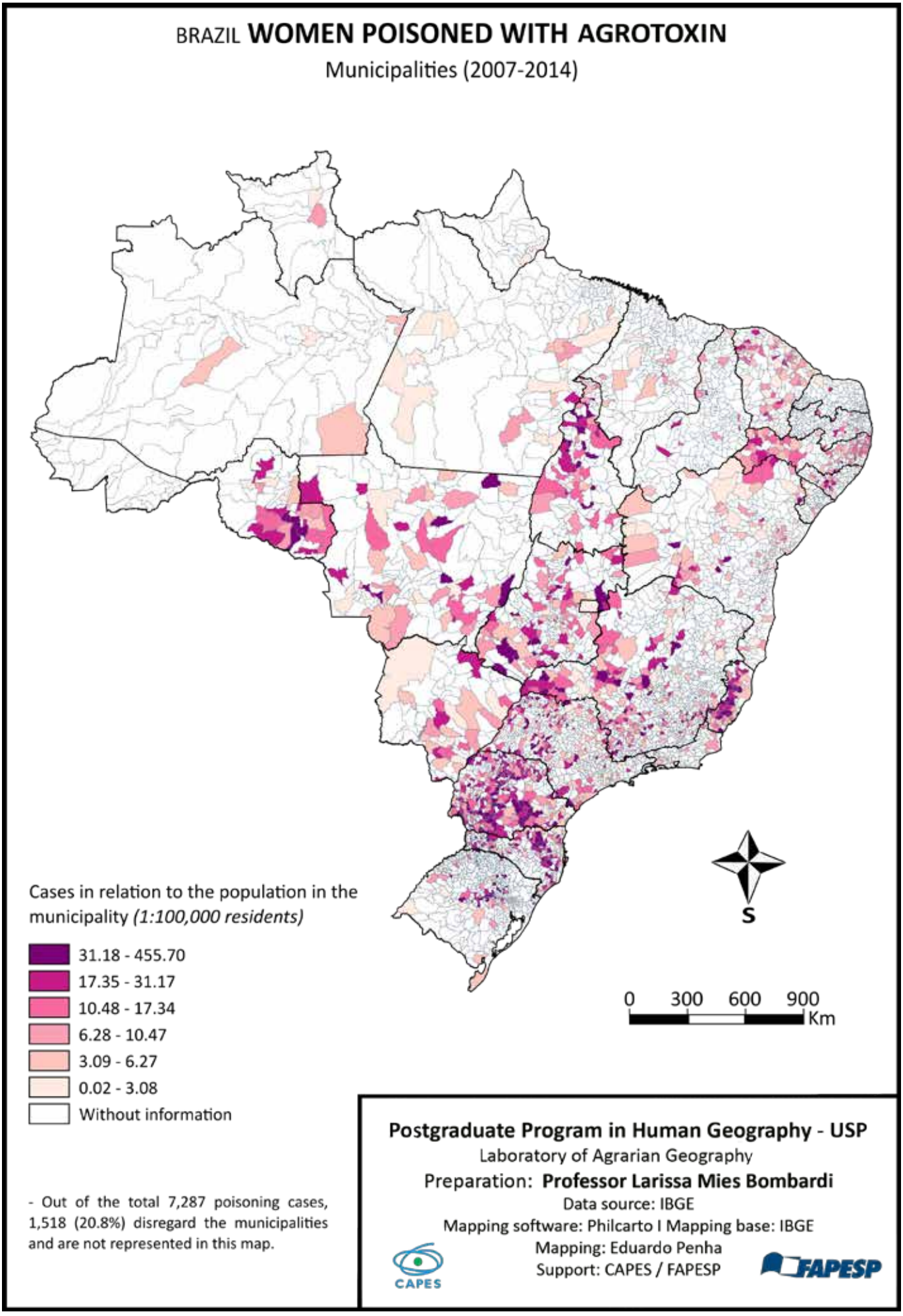

BRAZIL SUICIDE ATTEMPT USING AGROTOXINS
Municipalities (2007-2014)
Cases in relation to the population in the municipality (1:100,000 residents)
36.27 - 239.95
20.79 - 36.26
13.00 - 20.78
7.84 - 12.99
4.18 - 7.83
0.05 - 4.17
Without information
S
0 300 600 900 Km
- Out of the total 9,584 suicide attempt cases, 1,369 (14.3%) disregard the municipalities and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

BRAZIL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

SEX

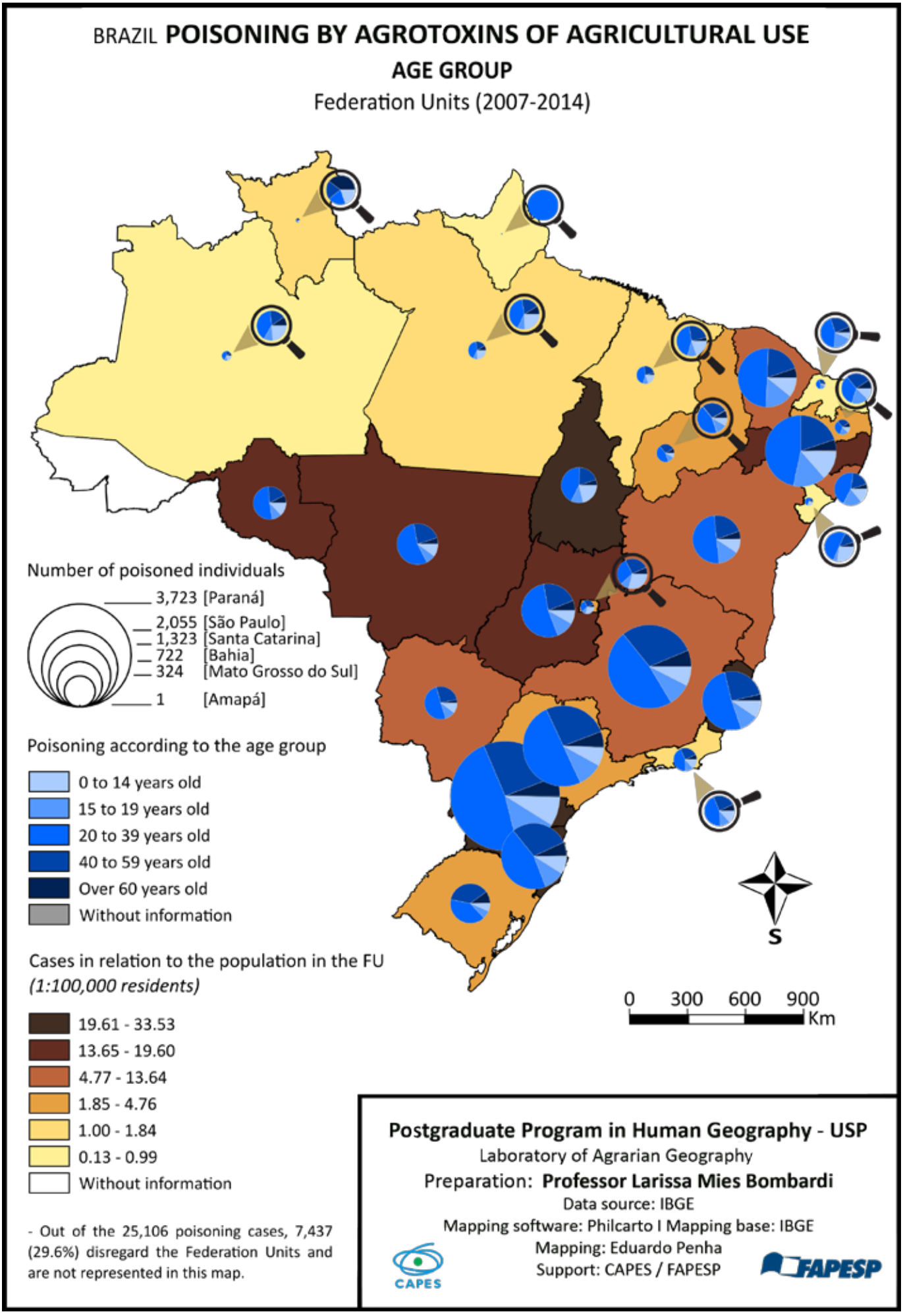

BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
SEX
Federation Units (2007-2014)
Number of poisoned individuals
3,723 [Paraná]
2,055 [São Paulo]
1,323 [Santa Catarina]
722 [Bahia]
324 [Mato Grosso do Sul]
1 [Amapá]
Poisoning according to the sex
Man
Woman
Without information
Cases in relation to the population of the FU
(1:100,000 residents)
19.61 - 33.53
13.65 - 19.60
4.77 - 13.64
1.85 - 4.76
1.00 - 1.84
0.13 - 0.99
Without information
S
0 300 600 900
Km
- Out of the 25,106 poisoning cases, 7,437 (29.6%) disregard the Federation Units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

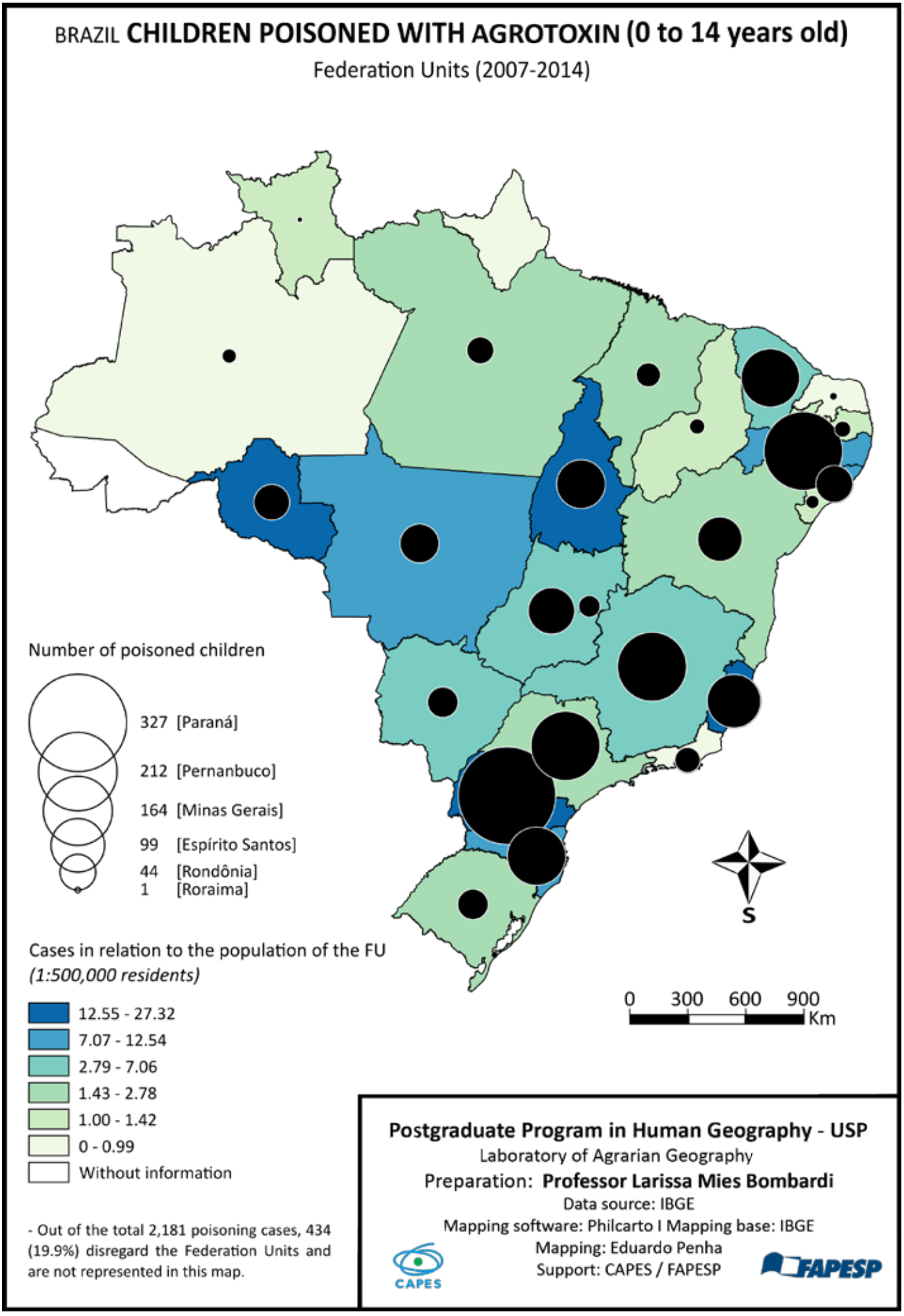

BRAZIL WOMEN POISONED WITH AGROTOXIN
Federation Units (2007-2014)
Number of poisoned women
1,076 [Paraná]
580 [São Paulo]
389 [Santa Catarina]
284 [Bahia]
80 [Mato Grosso do Sul]
1 [Amapá]
S
Cases in relation to the population of the FU
(1:100,000 residents)
8.04 - 9.69
4.61 - 8.03
1.88 - 4.60
0.60 - 1.87
0.45 - 0.59
0.13 - 0.44
Without information
0 300 600 900
Km
- Out of the 7,288 poisoning cases, 1,520 (20.9%) disregard the federation units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

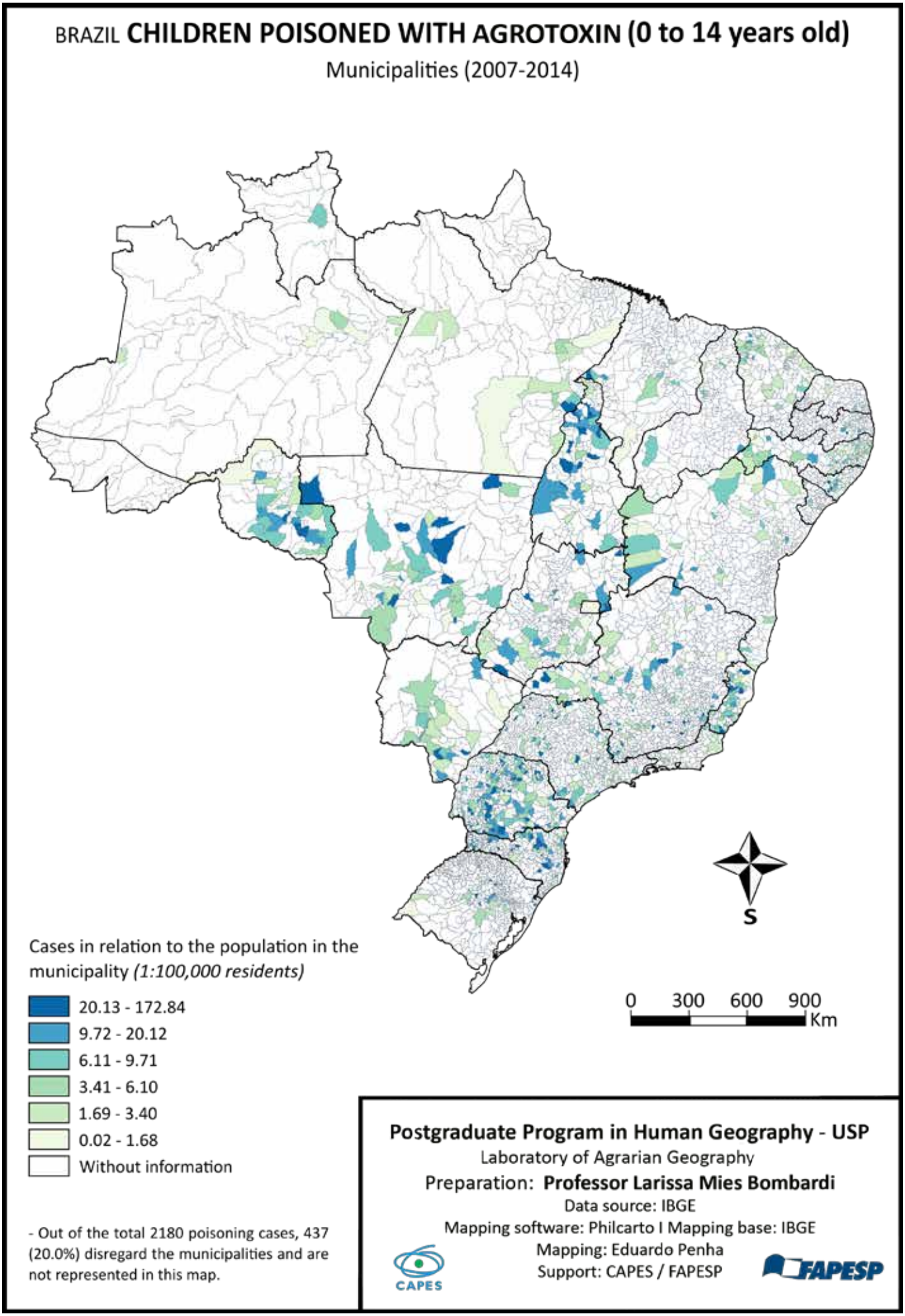

BRAZIL WOMEN POISONED WITH AGROTOXIN
Municipalities (2007-2014)
Cases in relation to the population in the municipality (1:100,000 residents)
31.18 - 455.70
17.35 - 31.17
10.48 - 17.34
6.28 - 10.47
3.09 - 6.27
0.02 - 3.08
Without information
S
0 300 600 900
Km
- Out of the total 7,287 poisoning cases, 1,518 (20.8%) disregard the municipalities and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

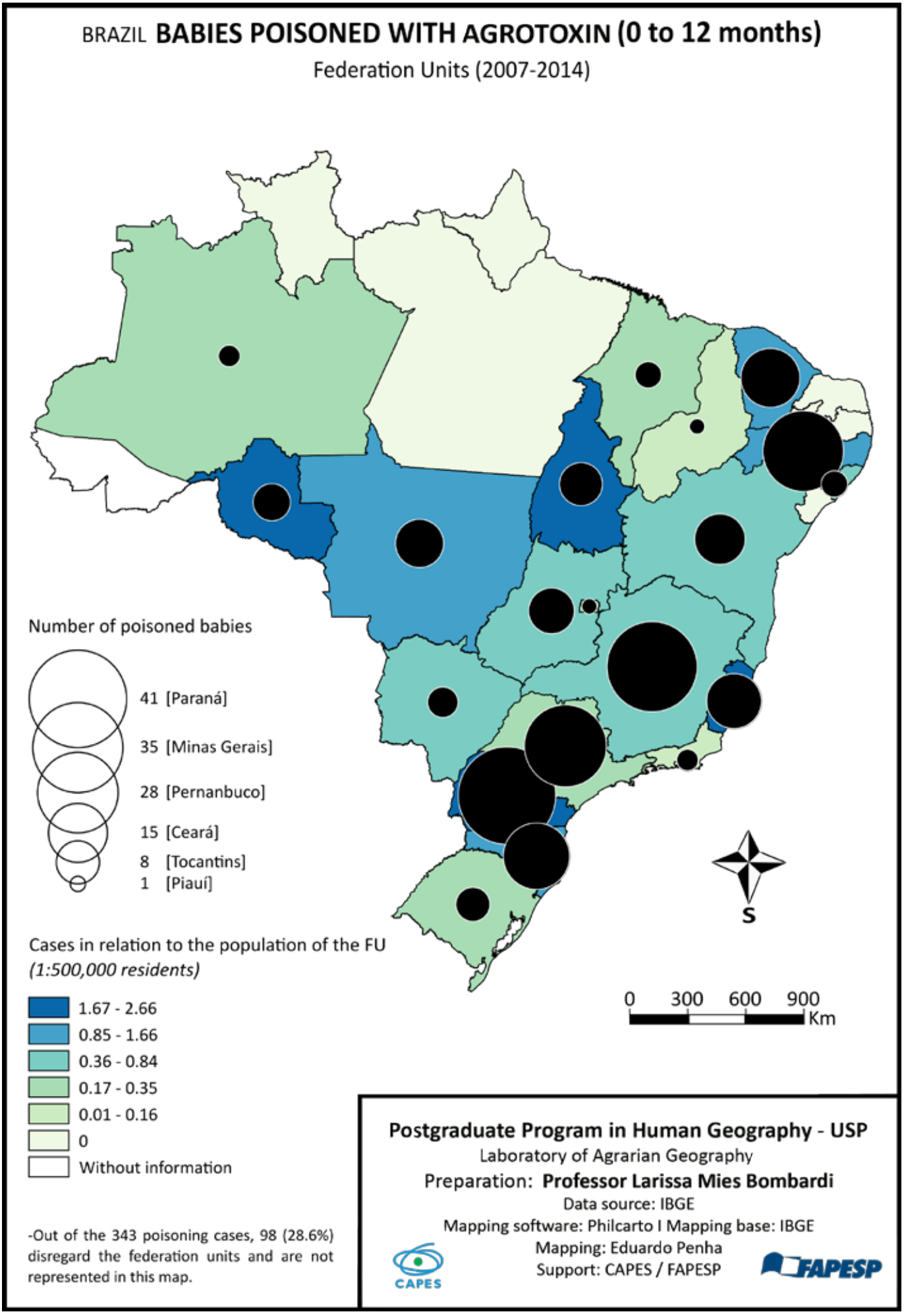
BRAZIL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

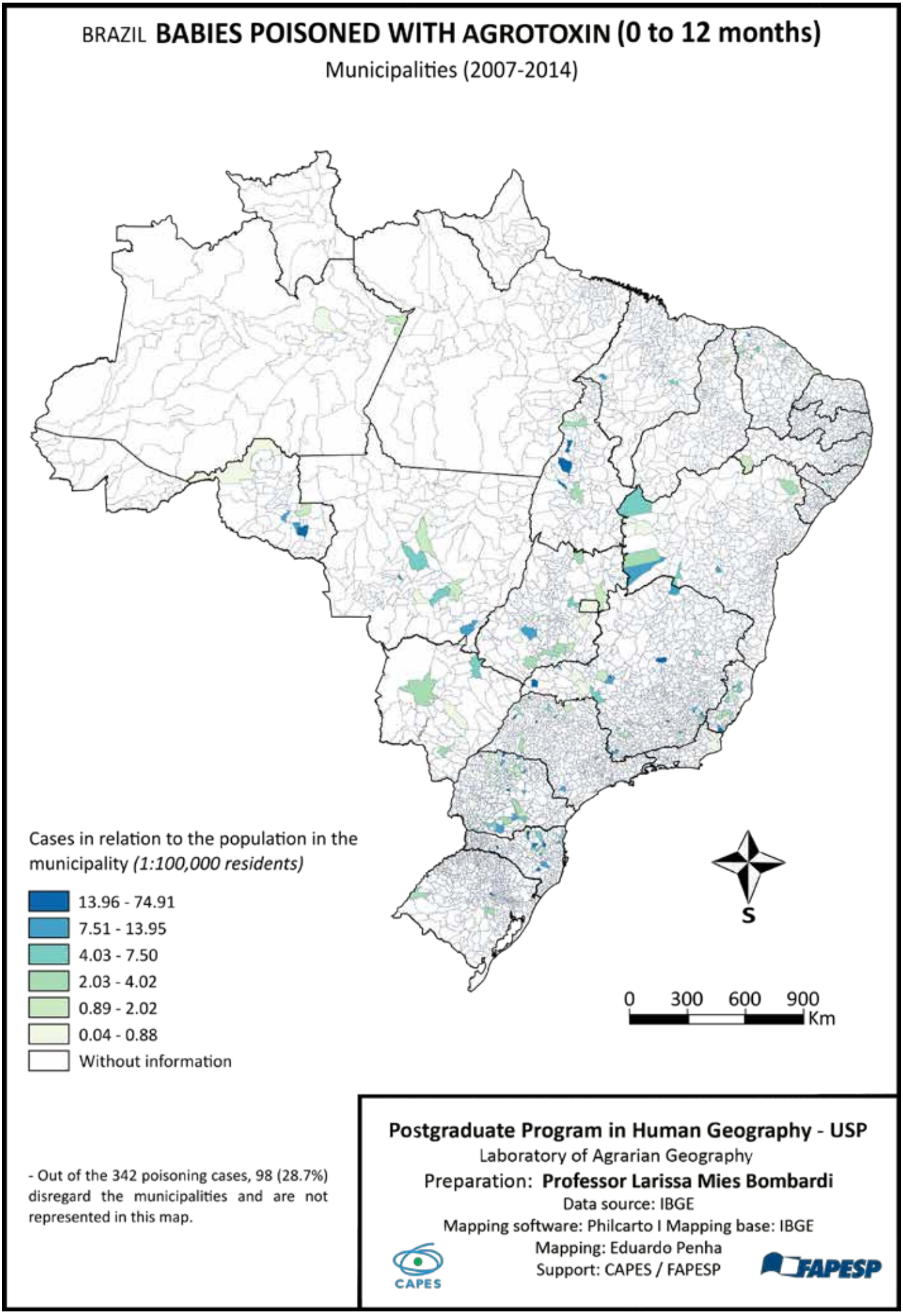
AGE GROUP

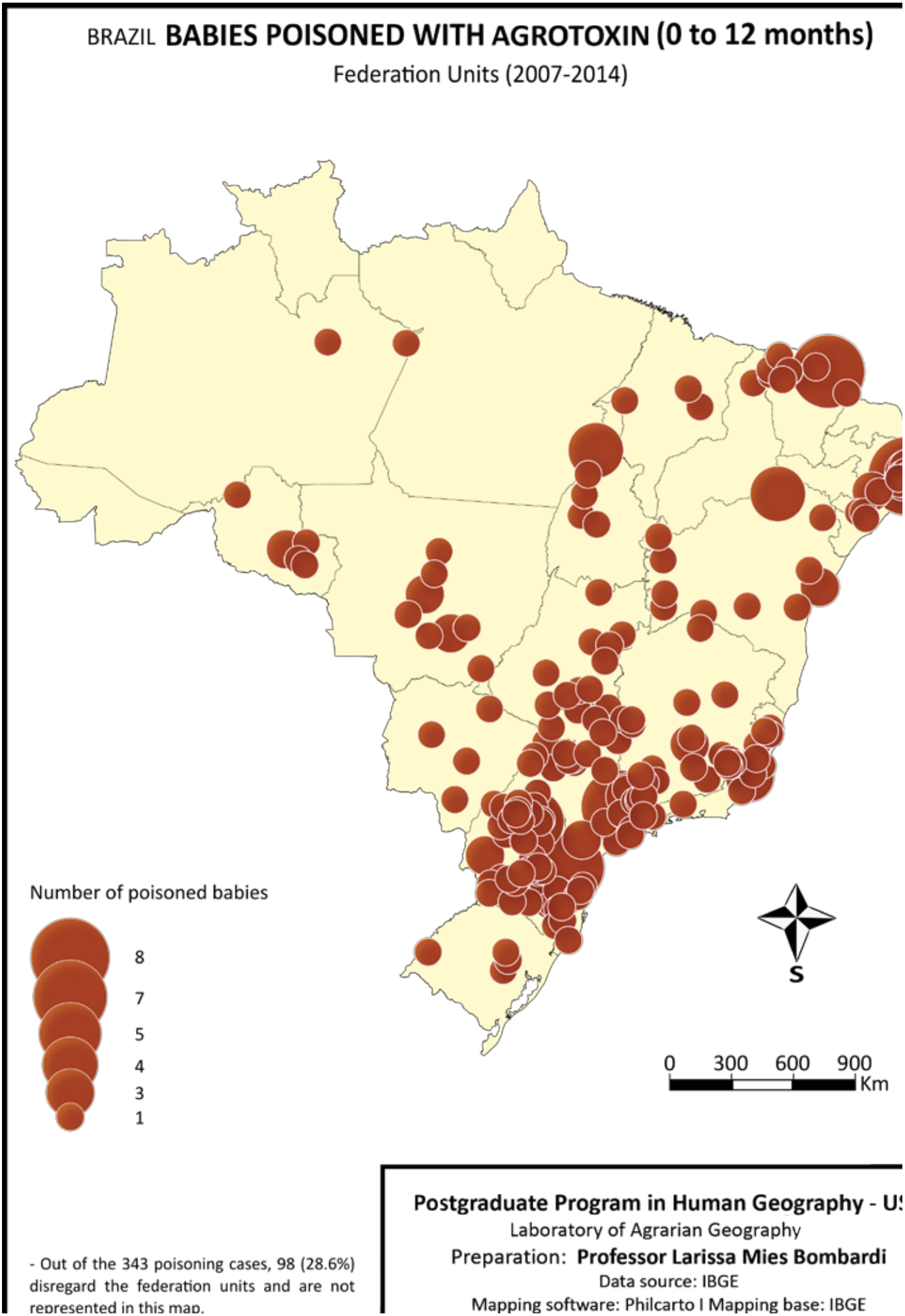

BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
AGE GROUP
Federation Units (2007-2014)
Number of poisoned individuals
3,723 [Paraná]
2,055 [São Paulo]
1,323 [Santa Catarina]
722 [Bahia]
324 [Mato Grosso do Sul]
1 [Amapá]
Poisoning according to the age group
0 to 14 years old
15 to 19 years old
20 to 39 years old
40 to 59 years old
Over 60 years old
Without information
Cases in relation to the population in the FU
(1:100,000 residents)
19.61 - 33.53
13.65 - 19.60
4.77 - 13.64
1.85 - 4.76
1.00 - 1.84
0.13 - 0.99
Without information
- Out of the 25,106 poisoning cases, 7,437 (29.6%) disregard the Federation Units and are not represented in this map.
S
0 300 600 900
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL CHILDREN POISONED WITH AGROTOXIN (0 to 14 years old)
Federation Units (2007-2014)
Number of poisoned children
327 [Paraná]
212 [Pernanbuco]
164 [Minas Gerais]
99 [Espírito Santos]
44 [Rondônia]
1 [Roraima]
S
Cases in relation to the population of the FU
(1:500,000 residents)
12.55 - 27.32
7.07 - 12.54
2.79 - 7.06
1.43 - 2.78
1.00 - 1.42
0 - 0.99
Without information
0 300 600 900
Km
- Out of the total 2,181 poisoning cases, 434 (19.9%) disregard the Federation Units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL CHILDREN POISONED WITH AGROTOXIN (0 to 14 years old)
Municipalities (2007-2014)
S
0 300 600 900
Km
Cases in relation to the population in the municipality (1:100,000 residents)
20.13 - 172.84
9.72 - 20.12
6.11 - 9.71
3.41 - 6.10
1.69 - 3.40
0.02 - 1.68
Without information
- Out of the total 2180 poisoning cases, 437 (20.0%) disregard the municipalities and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

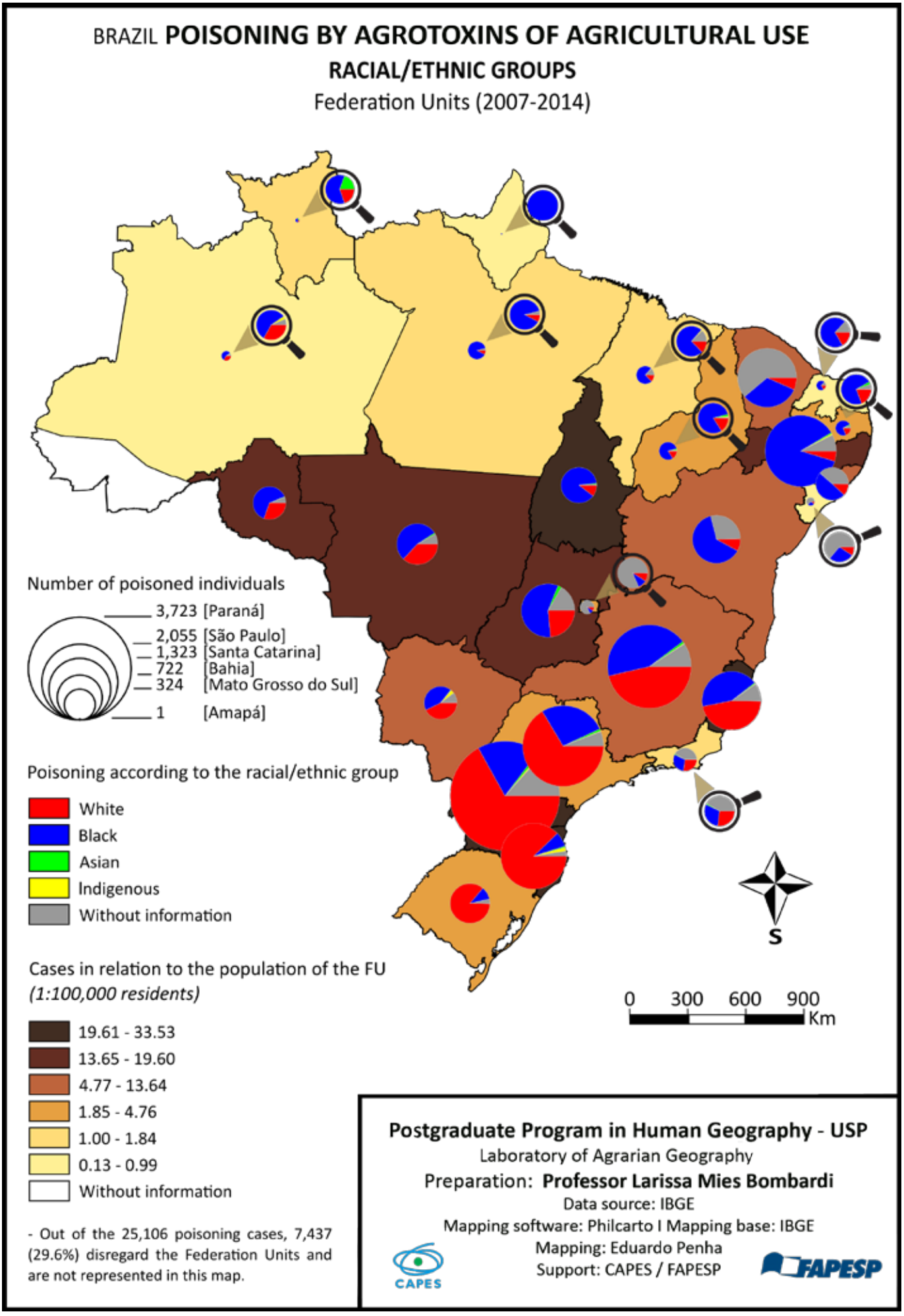

BRAZIL BABIES POISONED WITH AGROTOXIN (0 to 12 months)
Federation Units (2007-2014)
Number of poisoned babies
41 [Paraná]
35 [Minas Gerais]
28 [Pernanbuco]
15 [Ceará]
8 [Tocantins]
1 [Piauí]
S
Cases in relation to the population of the FU
(1:500,000 residents)
1.67 - 2.66
0.85 - 1.66
0.36 - 0.84
0.17 - 0.35
0.01 - 0.16
0
Without information
0 300 600 900
Km
-Out of the 343 poisoning cases, 98 (28.6%) disregard the federation units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

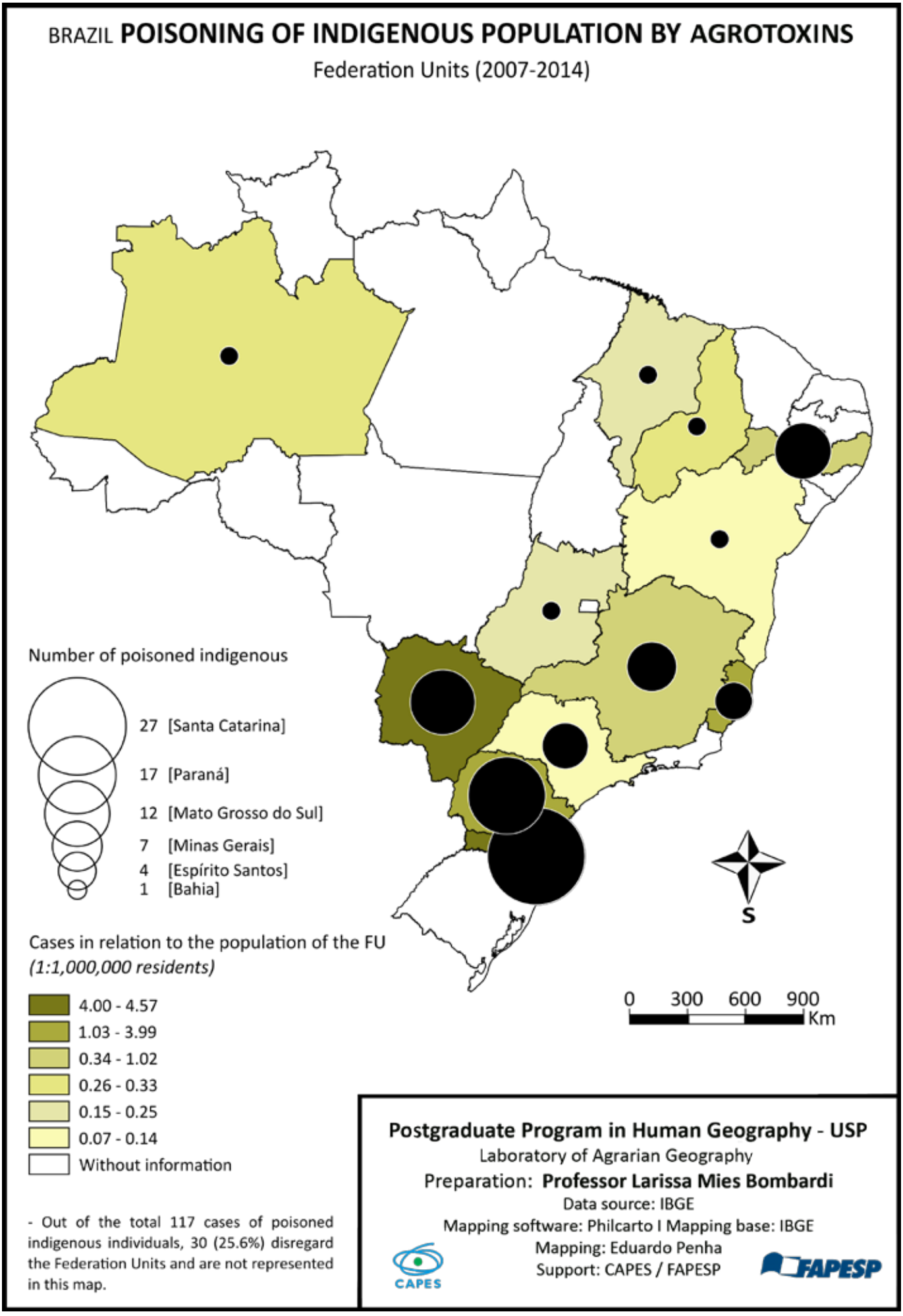

BRAZIL BABIES POISONED WITH AGROTOXIN (0 to 12 months)
Municipalities (2007-2014)
Cases in relation to the population in the municipality (1:100,000 residents)
13.96 - 74.91
7.51 - 13.95
4.03 - 7.50
2.03 - 4.02
0.89 - 2.02
0.04 - 0.88
Without information
S
0 300 600 900 Km
- Out of the 342 poisoning cases, 98 (28.7%) disregard the municipalities and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

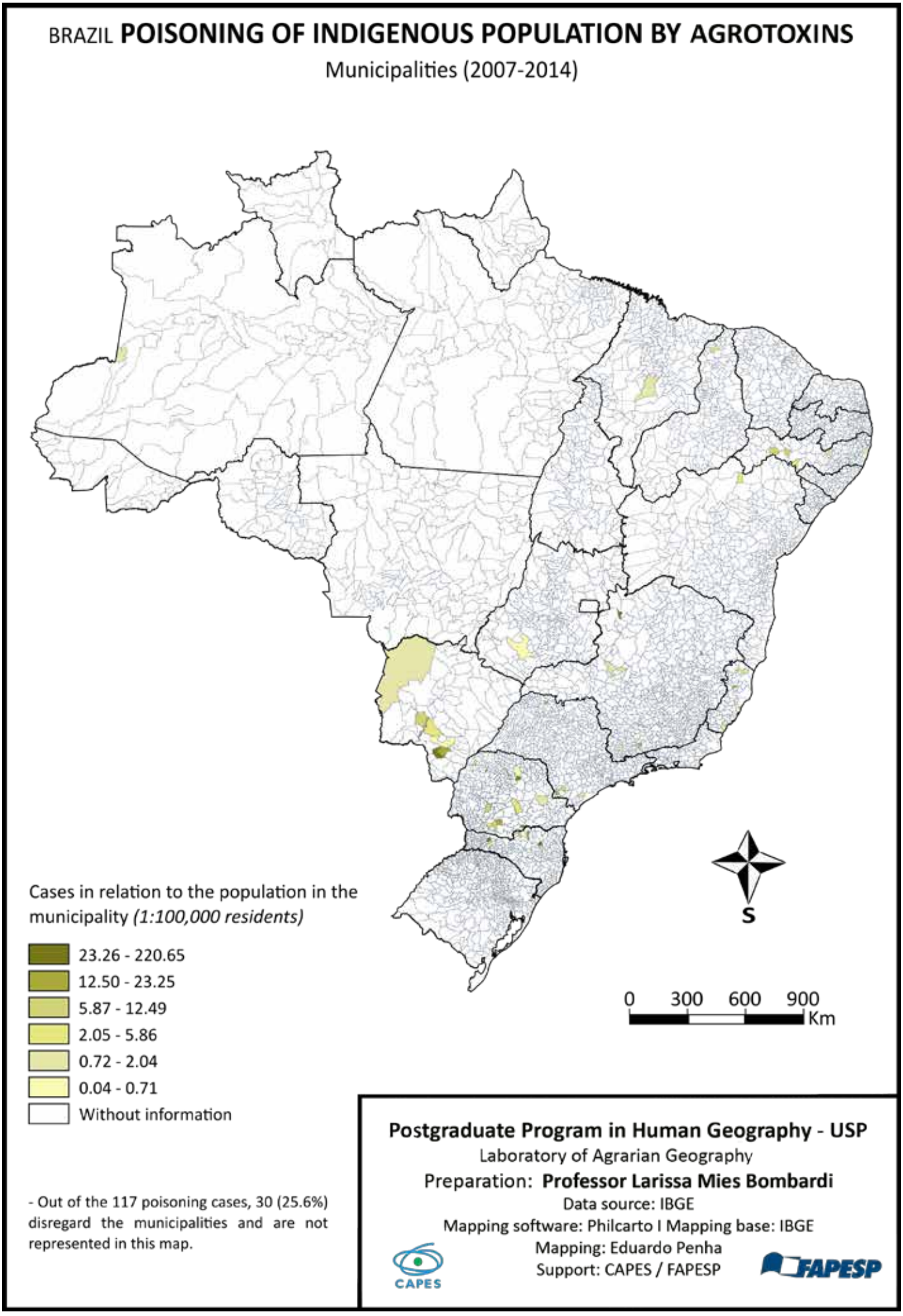

BRAZIL BABIES POISONED WITH AGROTOXIN (0 to 12 months)
Federation Units (2007-2014)
Number of poisoned babies
8
7
5
4
3
1
S
0 300 600 900
Km
Postgraduate Program in Human Geography - US
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
- Out of the 343 poisoning cases, 98 (28.6%) disregard the federation units and are not represented in this map.

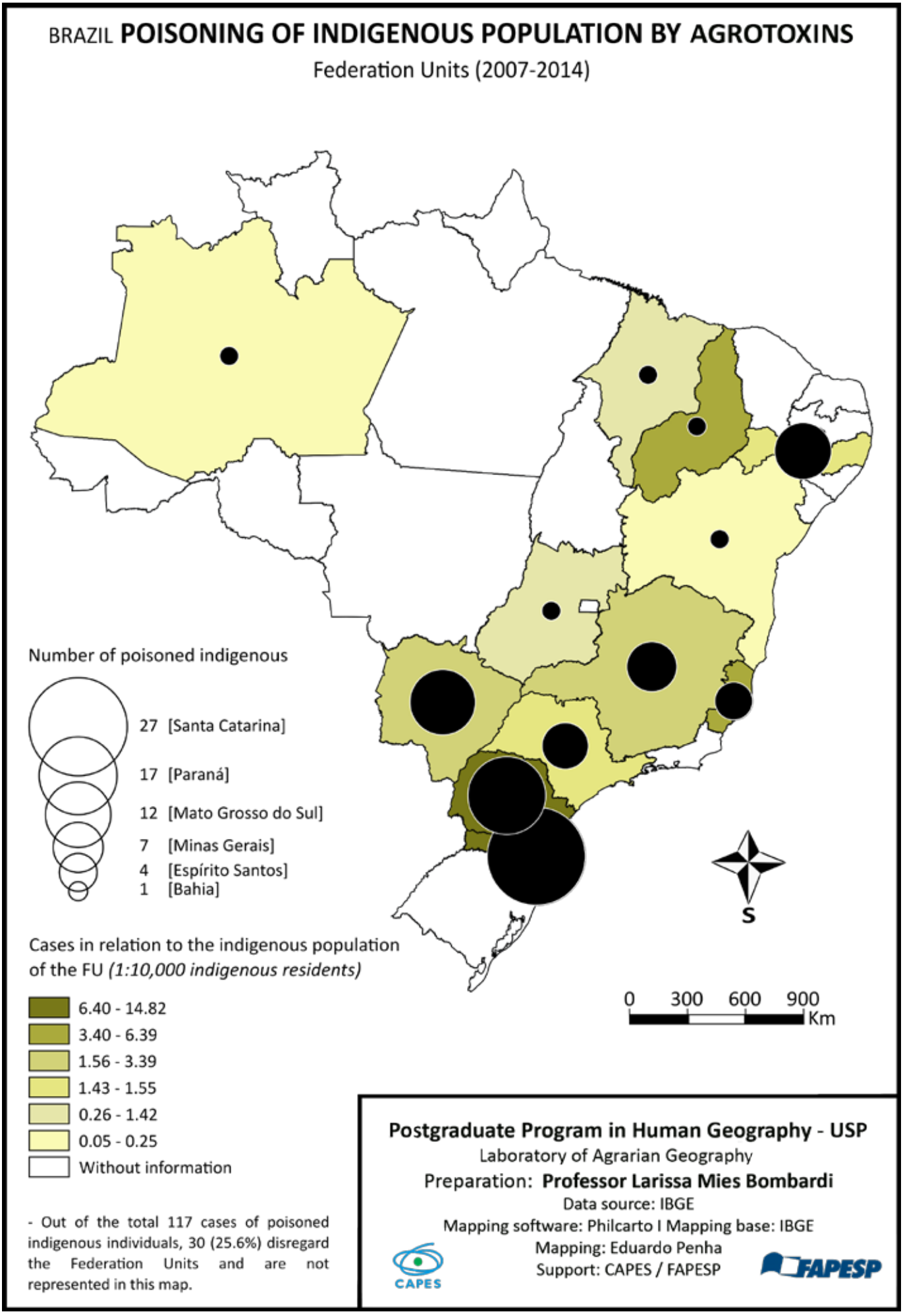
BRAZIL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

RACIAL/ETHNIC GROUP


BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
RACIAL/ETHNIC GROUPS
Federation Units (2007-2014)
Number of poisoned individuals
3,723 [Paraná]
2,055 [São Paulo]
1,323 [Santa Catarina]
722 [Bahia]
324 [Mato Grosso do Sul]
1 [Amapá]
Poisoning according to the racial/ethnic group
White
Black
Asian
Indigenous
Without information
Cases in relation to the population of the FU
(1:100,000 residents)
19.61 - 33.53
13.65 - 19.60
4.77 - 13.64
1.85 - 4.76
1.00 - 1.84
0.13 - 0.99
Without information
- Out of the 25,106 poisoning cases, 7,437 (29.6%) disregard the Federation Units and are not represented in this map.
S
0 300 600 900
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

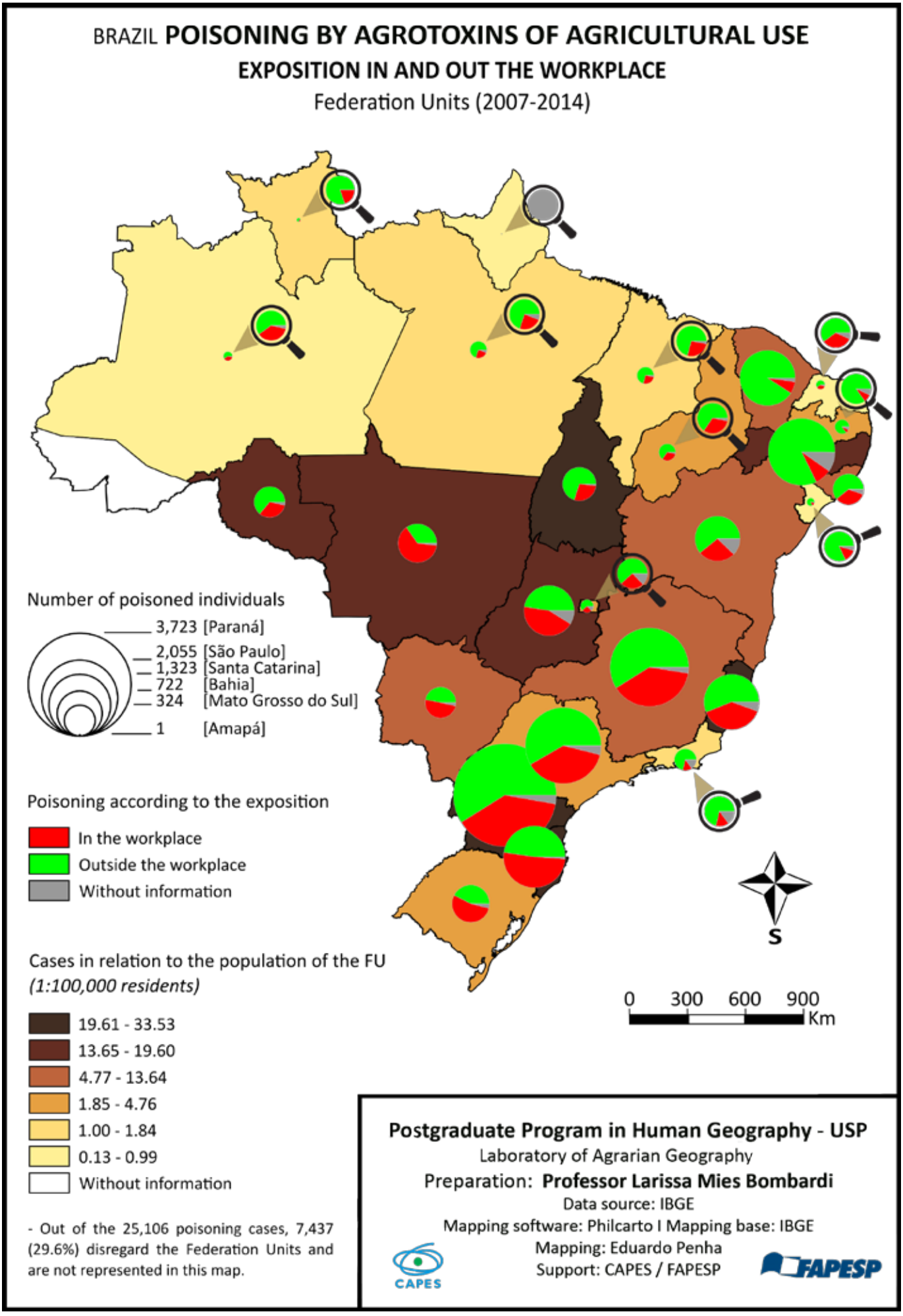

BRAZIL POISONING OF INDIGENOUS POPULATION BY AGROTOXINS
Federation Units (2007-2014)
Number of poisoned indigenous
27 [Santa Catarina]
17 [Paraná]
12 [Mato Grosso do Sul]
7 [Minas Gerais]
4 [Espírito Santos]
1 [Bahia]
S
0 300 600 900
Km
Cases in relation to the population of the FU
(1:1,000,000 residents)
4.00 - 4.57
1.03 - 3.99
0.34 - 1.02
0.26 - 0.33
0.15 - 0.25
0.07 - 0.14
Without information
- Out of the total 117 cases of poisoned indigenous individuals, 30 (25.6%) disregard the Federation Units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

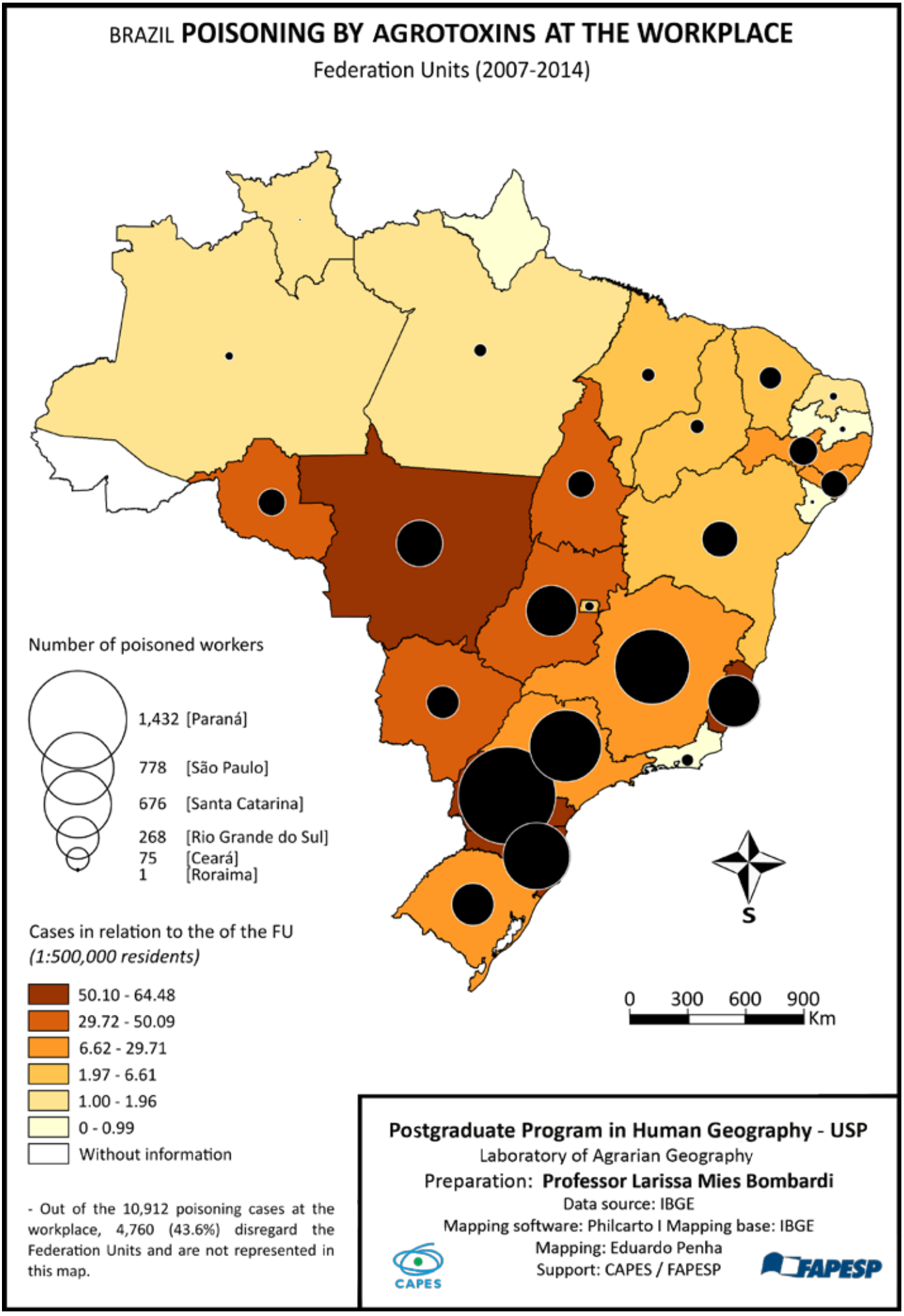

BRAZIL POISONING OF INDIGENOUS POPULATION BY AGROTOXINS
Municipalities (2007-2014)
Cases in relation to the population in the municipality (1:100,000 residents)
23.26 - 220.65
12.50 - 23.25
5.87 - 12.49
2.05 - 5.86
0.72 - 2.04
0.04 - 0.71
Without information
S
0 300 600 900
Km
- Out of the 117 poisoning cases, 30 (25.6%) disregard the municipalities and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

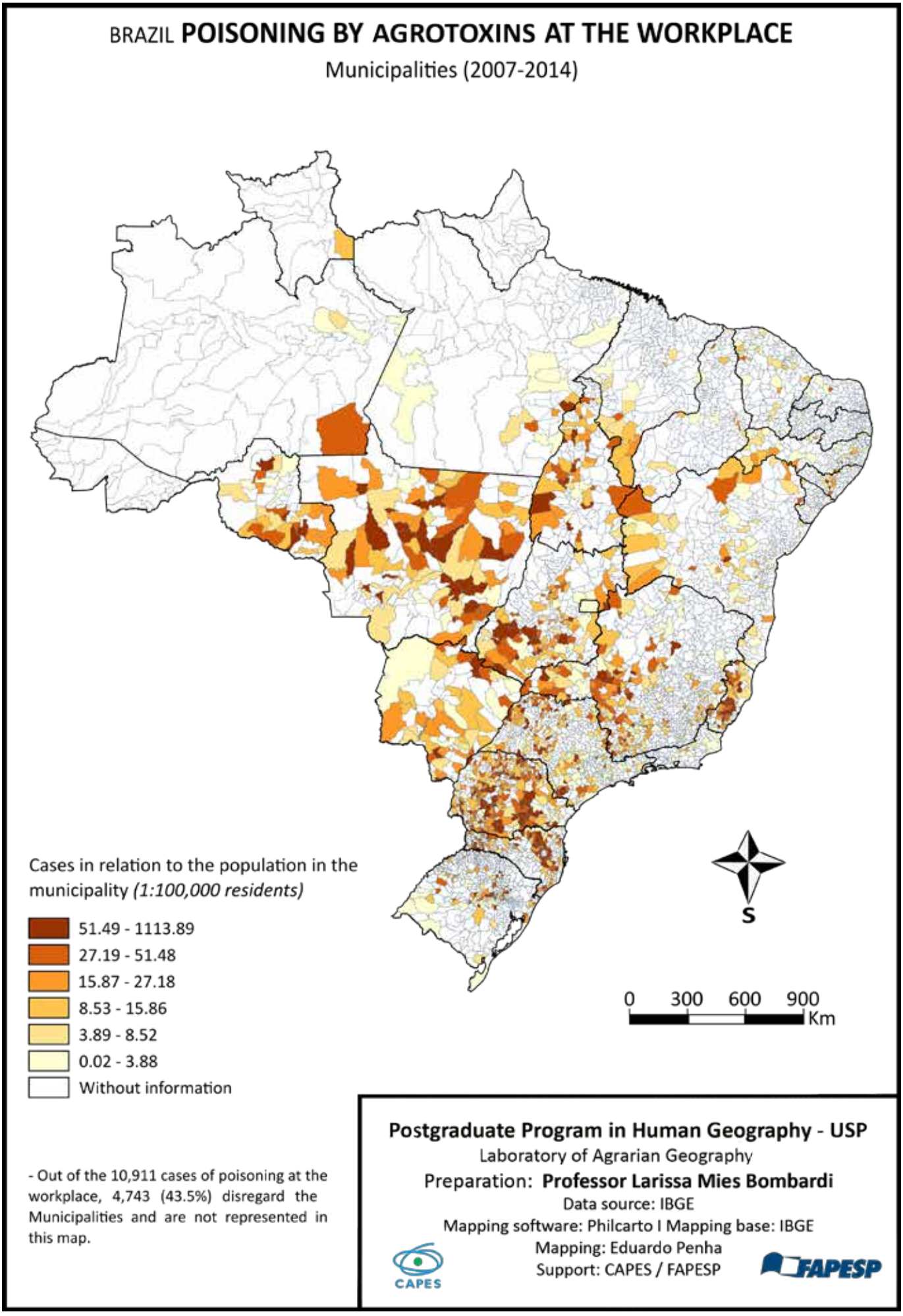

BRAZIL POISONING OF INDIGENOUS POPULATION BY AGROTOXINS
Federation Units (2007-2014)
Number of poisoned indigenous
27 [Santa Catarina]
17 [Paraná]
12 [Mato Grosso do Sul]
7 [Minas Gerais]
4 [Espírito Santos]
1 [Bahia]
S
0 300 600 900
Km
Cases in relation to the indigenous population of the FU (1:10,000 indigenous residents)
6.40 - 14.82
3.40 - 6.39
1.56 - 3.39
1.43 - 1.55
0.26 - 1.42
0.05 - 0.25
Without information
- Out of the total 117 cases of poisoned indigenous individuals, 30 (25.6%) disregard the Federation Units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

BRAZIL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

EXPOSURE IN AND OUTSIDE THE WORKPLACE

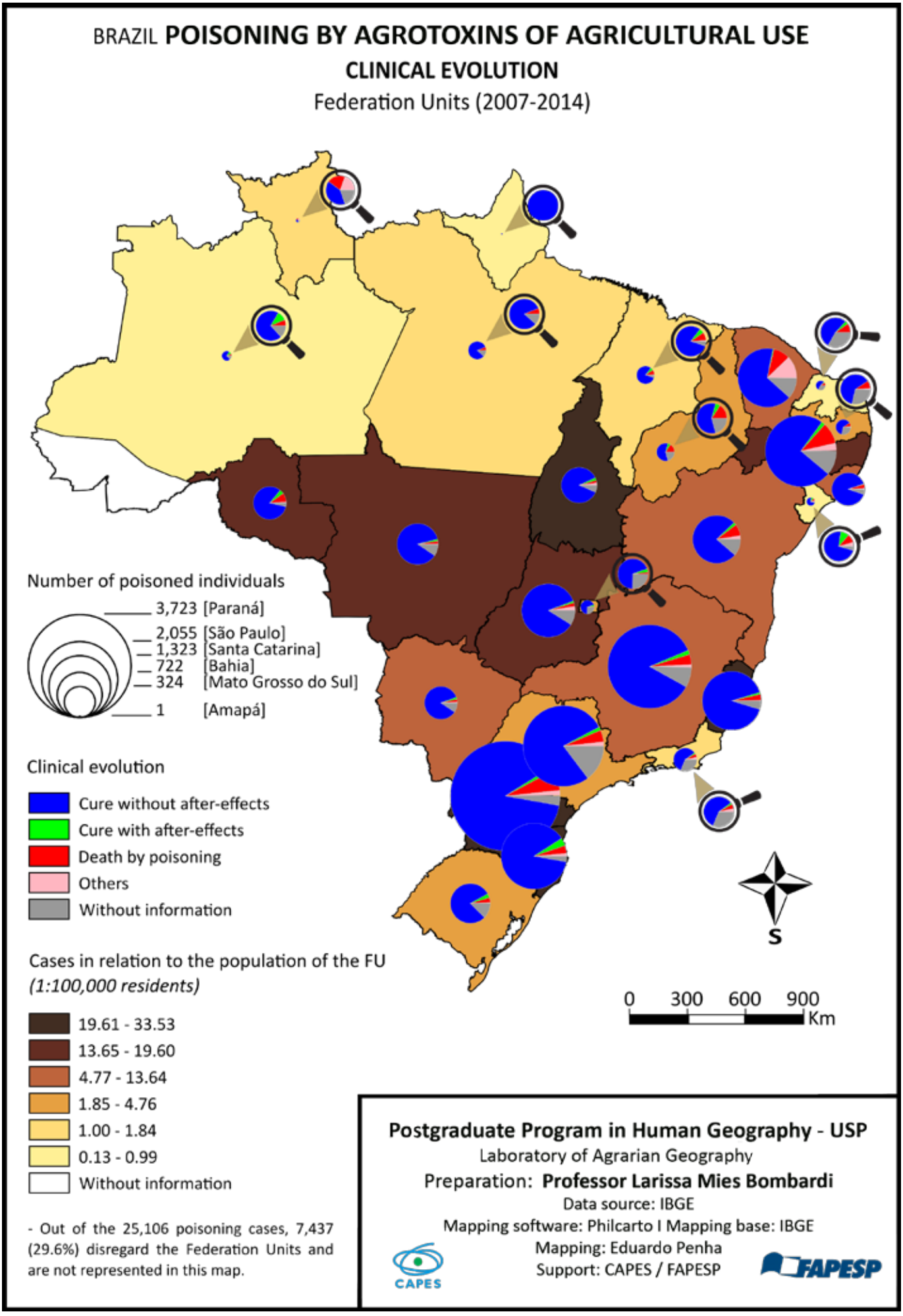

BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
EXPOSITION IN AND OUT THE WORKPLACE
Federation Units (2007-2014)
Number of poisoned individuals
3,723 [Paraná]
2,055 [São Paulo]
1,323 [Santa Catarina]
722 [Bahia]
324 [Mato Grosso do Sul]
1 [Amapá]
Poisoning according to the exposition
In the workplace
Outside the workplace
Without information
Cases in relation to the population of the FU
(1:100,000 residents)
19.61 - 33.53
13.65 - 19.60
4.77 - 13.64
1.85 - 4.76
1.00 - 1.84
0.13 - 0.99
Without information
- Out of the 25,106 poisoning cases, 7,437 (29.6%) disregard the Federation Units and are not represented in this map.
S
0 300 600 900
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

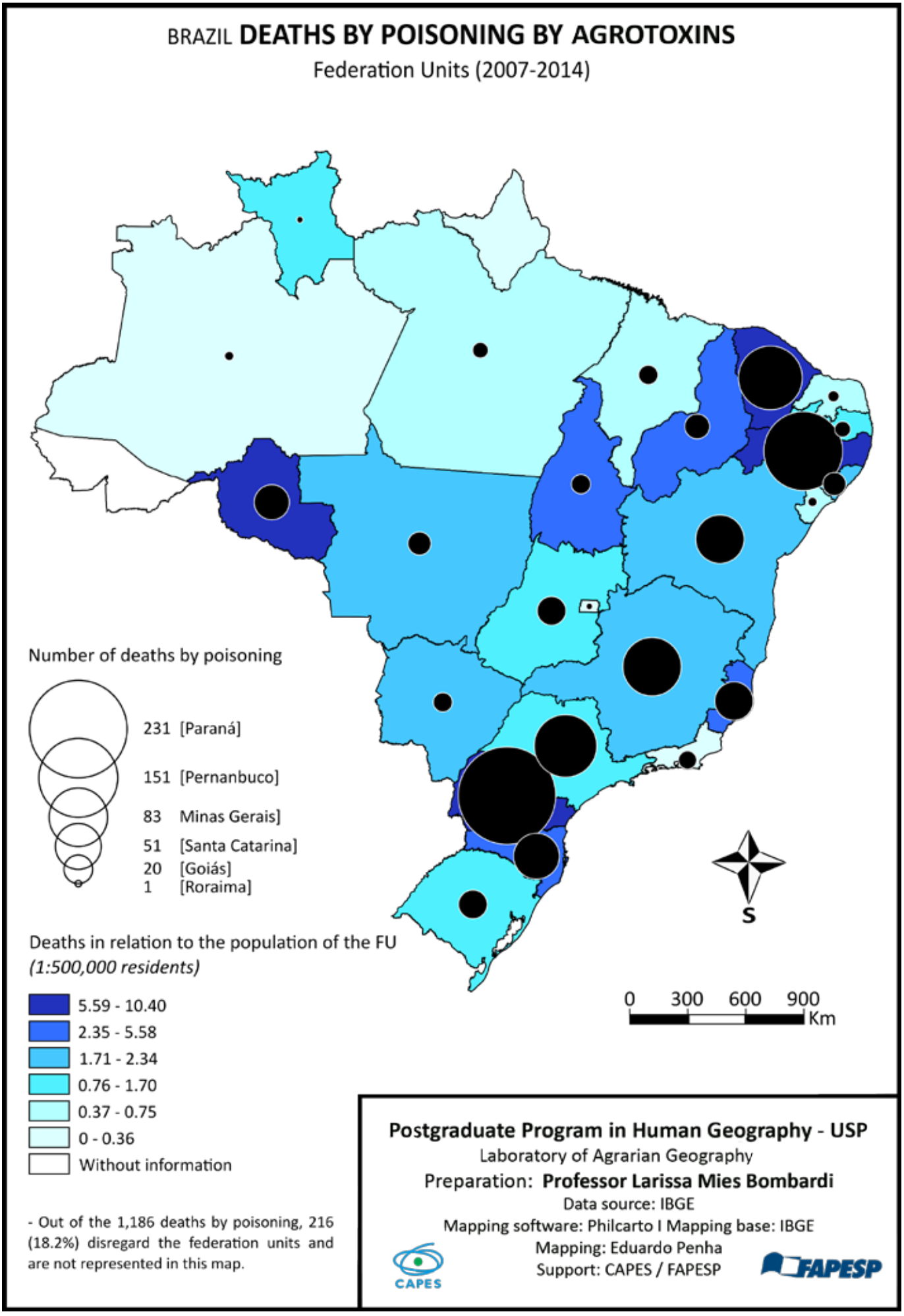

BRAZIL POISONING BY AGROTOXINS AT THE WORKPLACE
Federation Units (2007-2014)
Number of poisoned workers
1,432 [Paraná]
778 [São Paulo]
676 [Santa Catarina]
268 [Rio Grande do Sul]
75 [Ceará]
1 [Roraima]
Cases in relation to the of the FU
(1:500,000 residents)
50.10 - 64.48
29.72 - 50.09
6.62 - 29.71
1.97 - 6.61
1.00 - 1.96
0 - 0.99
Without information
- Out of the 10,912 poisoning cases at the workplace, 4,760 (43.6%) disregard the Federation Units and are not represented in this map.
S
0 300 600 900
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

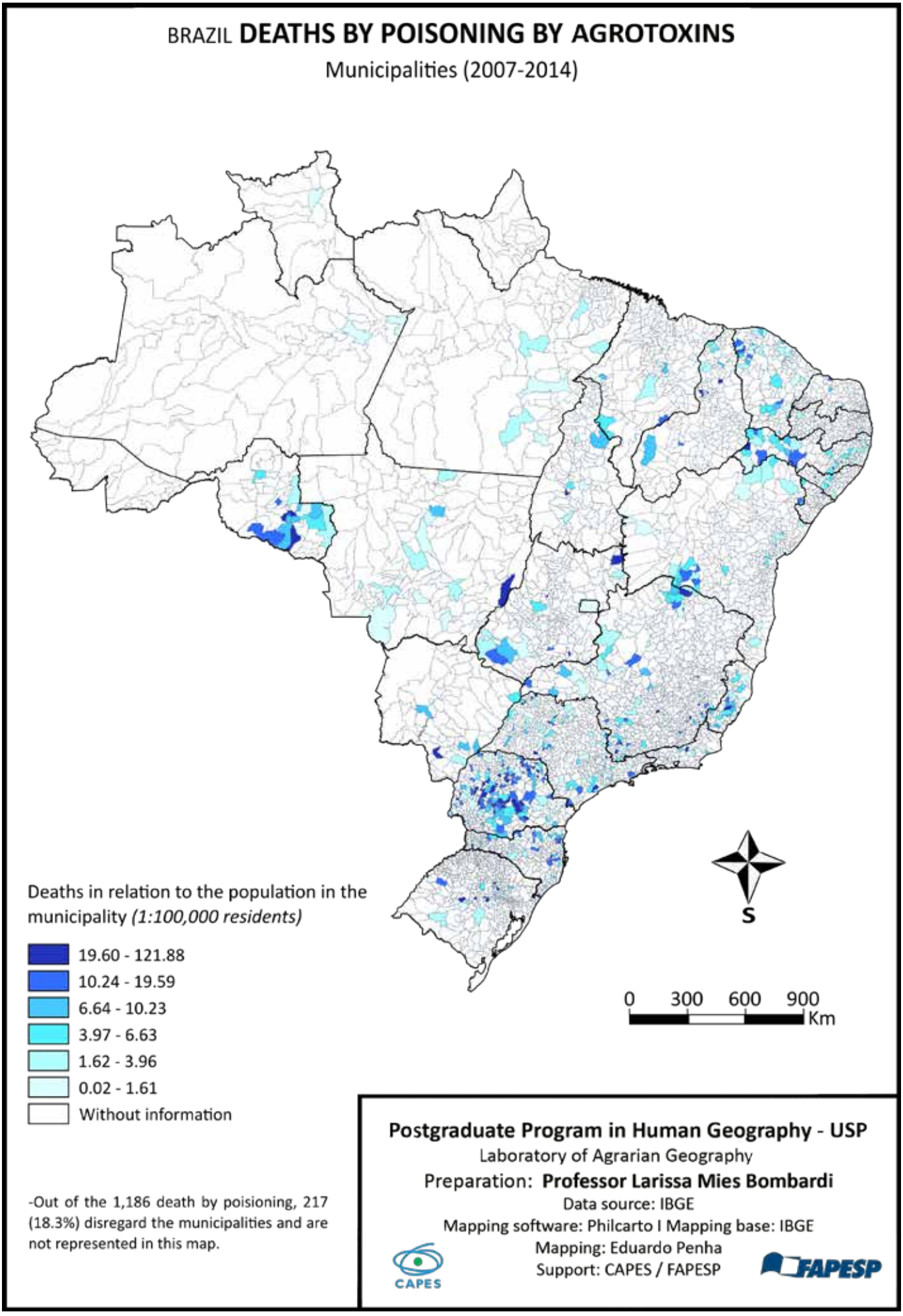

BRAZIL POISONING BY AGROTOXINS AT THE WORKPLACE
Municipalities (2007-2014)
Cases in relation to the population in the municipality (1:100,000 residents)
51.49 - 1113.89
27.19 - 51.48
15.87 - 27.18
8.53 - 15.86
3.89 - 8.52
0.02 - 3.88
Without information
S
0 300 600 900 Km
- Out of the 10,911 cases of poisoning at the workplace, 4,743 (43.5%) disregard the Municipalities and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

BRAZIL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

CLINICAL EVOLUTION

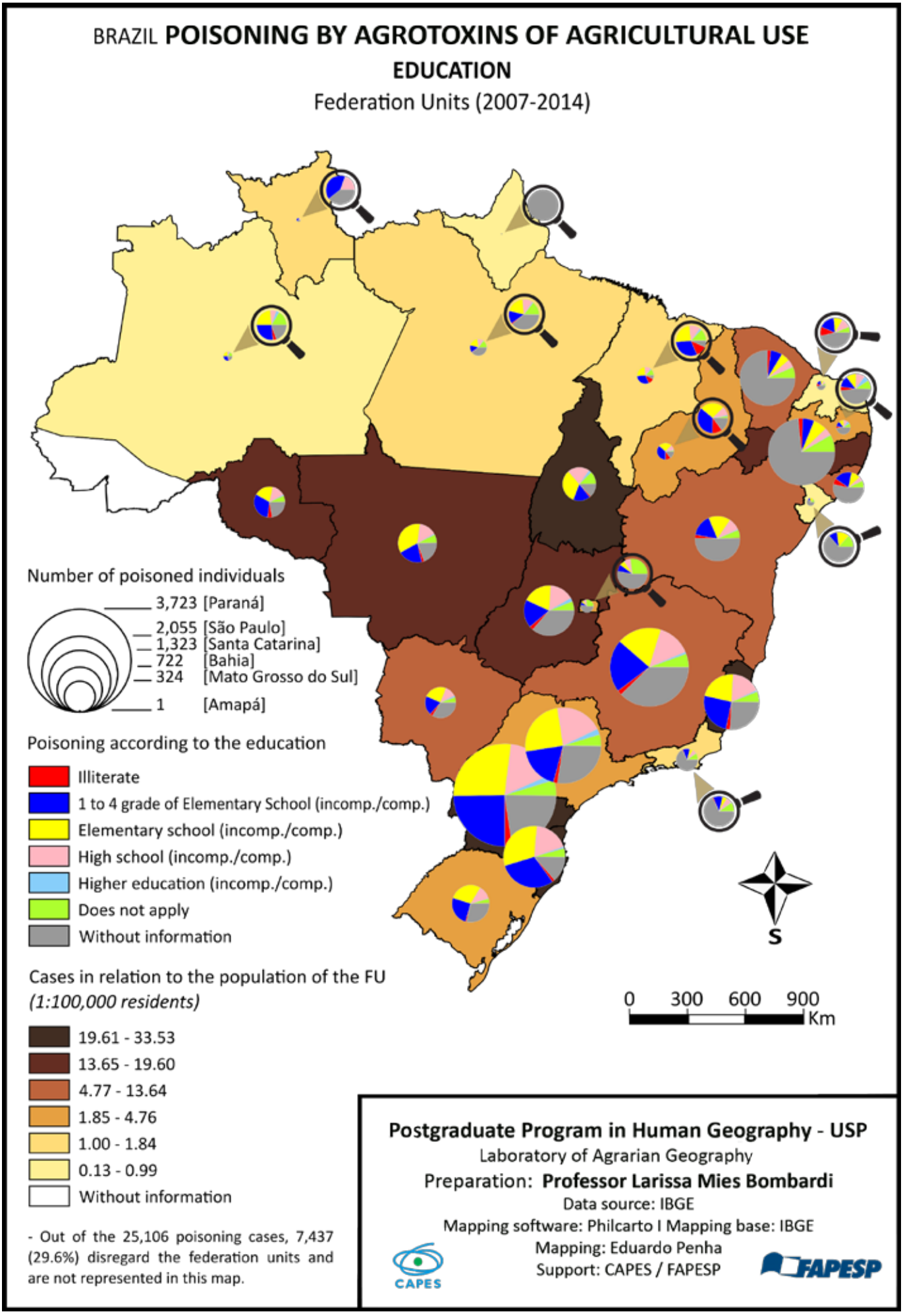

BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
CLINICAL EVOLUTION
Federation Units (2007-2014)
Number of poisoned individuals
3,723 [Paraná]
2,055 [São Paulo]
1,323 [Santa Catarina]
722 [Bahia]
324 [Mato Grosso do Sul]
1 [Amapá]
Clinical evolution
Cure without after-effects
Cure with after-effects
Death by poisoning
Others
Without information
Cases in relation to the population of the FU
(1:100,000 residents)
19.61 - 33.53
13.65 - 19.60
4.77 - 13.64
1.85 - 4.76
1.00 - 1.84
0.13 - 0.99
Without information
- Out of the 25,106 poisoning cases, 7,437 (29.6%) disregard the Federation Units and are not represented in this map.
S
0 300 600 900
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL DEATHS BY POISONING BY AGROTOXINS
Federation Units (2007-2014)
Number of deaths by poisoning
231 [Paraná]
151 [Pernanbuco]
83 Minas Gerais]
51 [Santa Catarina]
20 [Goiás]
1 [Roraima]
S
Deaths in relation to the population of the FU
(1:500,000 residents)
5.59 - 10.40
2.35 - 5.58
1.71 - 2.34
0.76 - 1.70
0.37 - 0.75
0 - 0.36
Without information
0 300 600 900
Km
- Out of the 1,186 deaths by poisoning, 216 (18.2%) disregard the federation units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL DEATHS BY POISONING BY AGROTOXINS
Municipalities (2007-2014)
Deaths in relation to the population in the municipality (1:100,000 residents)
19.60 - 121.88
10.24 - 19.59
6.64 - 10.23
3.97 - 6.63
1.62 - 3.96
0.02 - 1.61
Without information
S
0 300 600 900
Km
-Out of the 1,186 death by poisioning, 217 (18.3%) disregard the municipalities and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

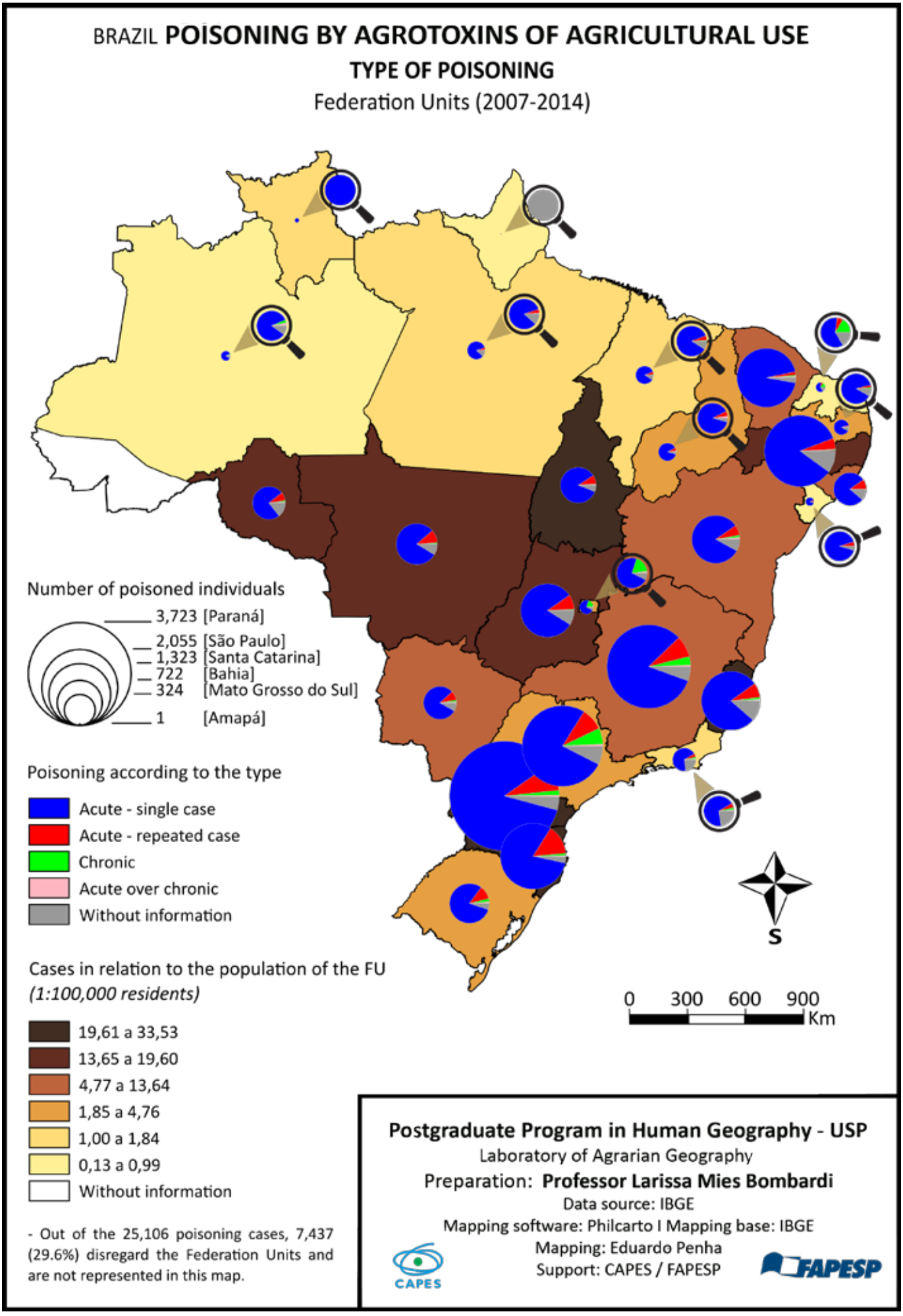
BRAZIL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

LEVEL OF EDUCATION

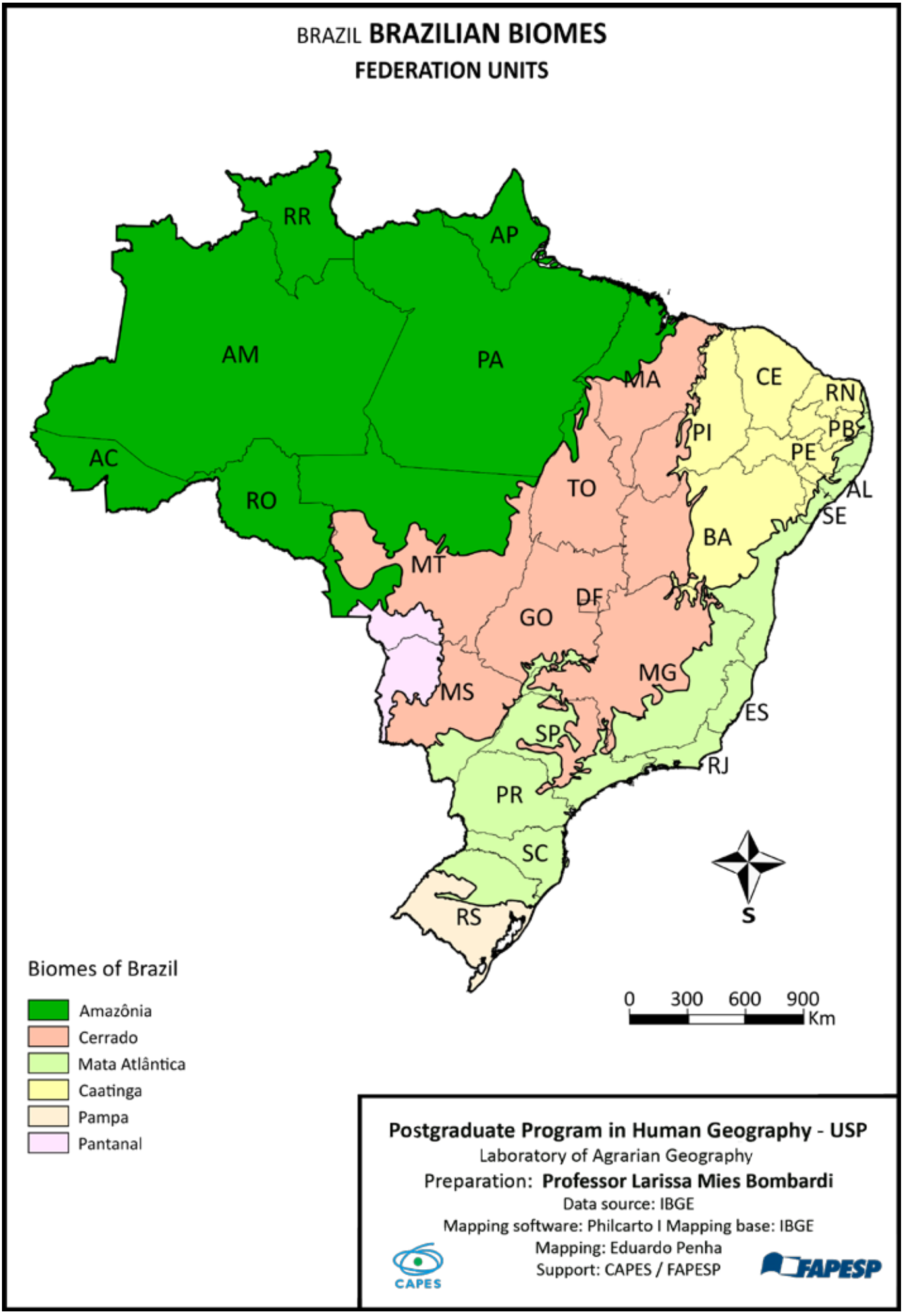

BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
EDUCATION
Federation Units (2007-2014)
Number of poisoned individuals
3,723 [Paraná]
2,055 [São Paulo]
1,323 [Santa Catarina]
722 [Bahia]
324 [Mato Grosso do Sul]
1 [Amapá]
Poisoning according to the education
Illiterate
1 to 4 grade of Elementary School (incomp./comp.)
Elementary school (incomp./comp.)
High school (incomp./comp.)
Higher education (incomp./comp.)
Does not apply
Without information
Cases in relation to the population of the FU
(1:100,000 residents)
19.61 - 33.53
13.65 - 19.60
4.77 - 13.64
1.85 - 4.76
1.00 - 1.84
0.13 - 0.99
Without information
- Out of the 25,106 poisoning cases, 7,437 (29.6%) disregard the federation units and are not represented in this map.
S
0 300 600 900
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

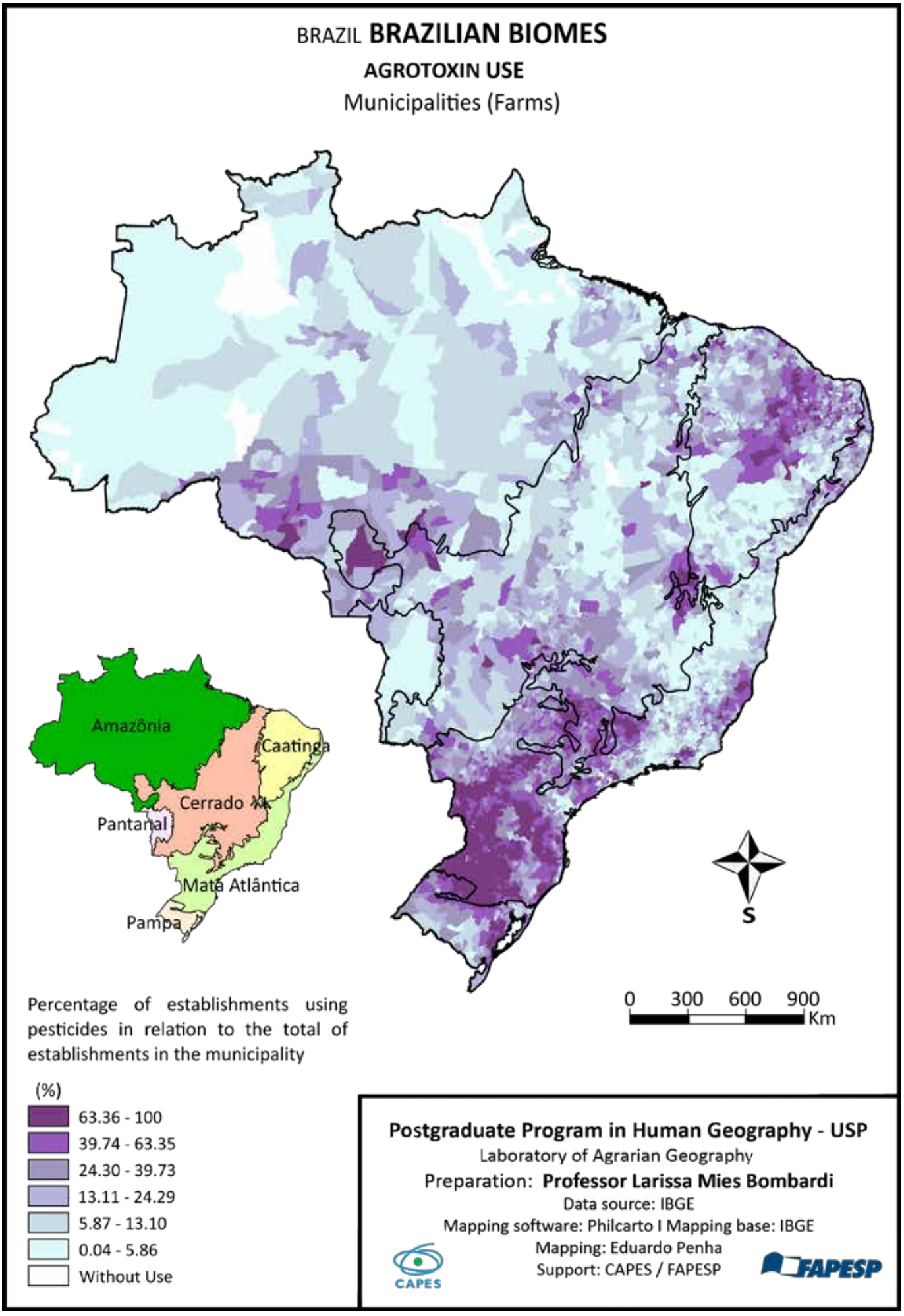
BRAZIL **POISONING BY AGROTOXINS OF AGRICULTURAL USE**

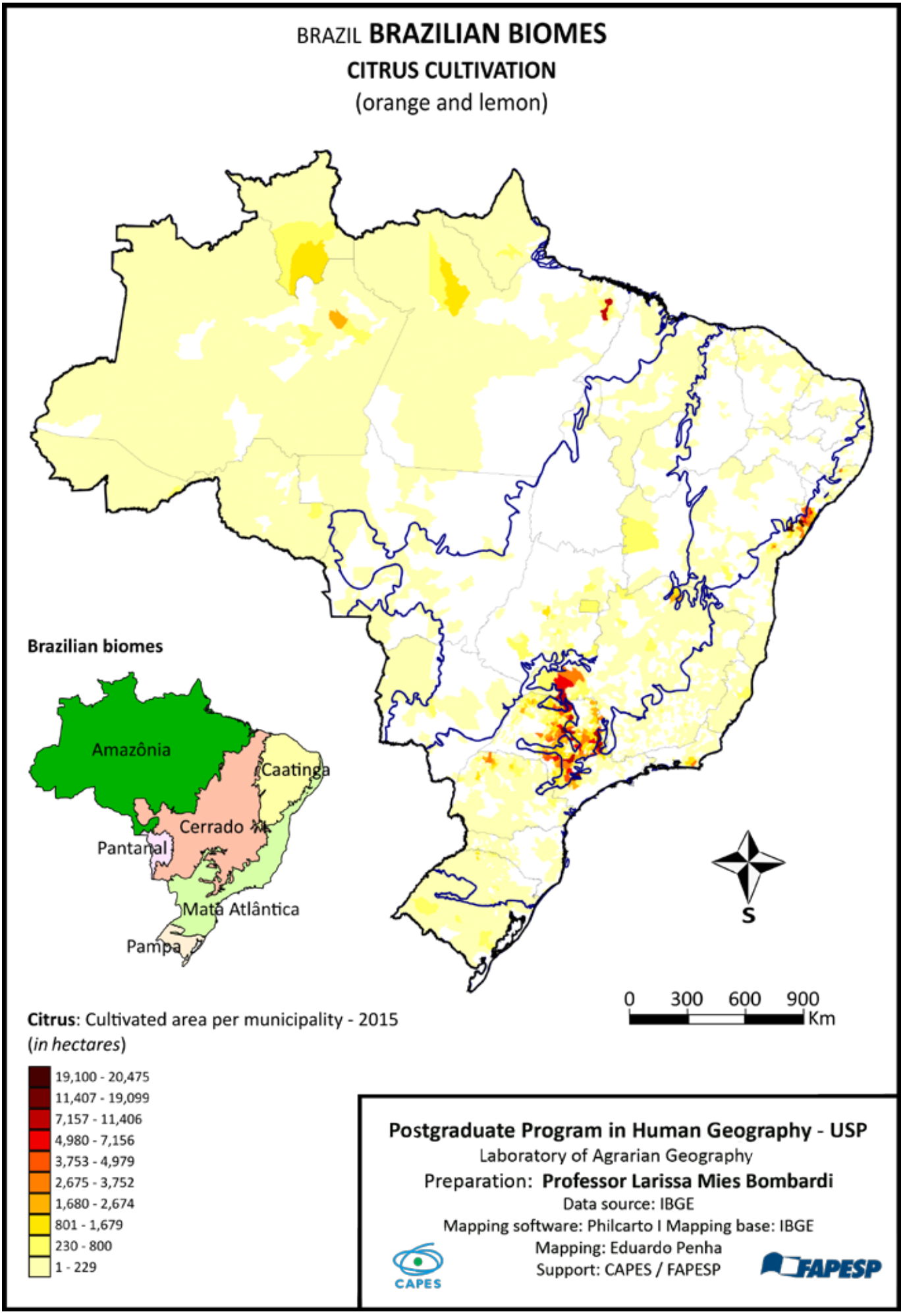
TYPE OF POISONING

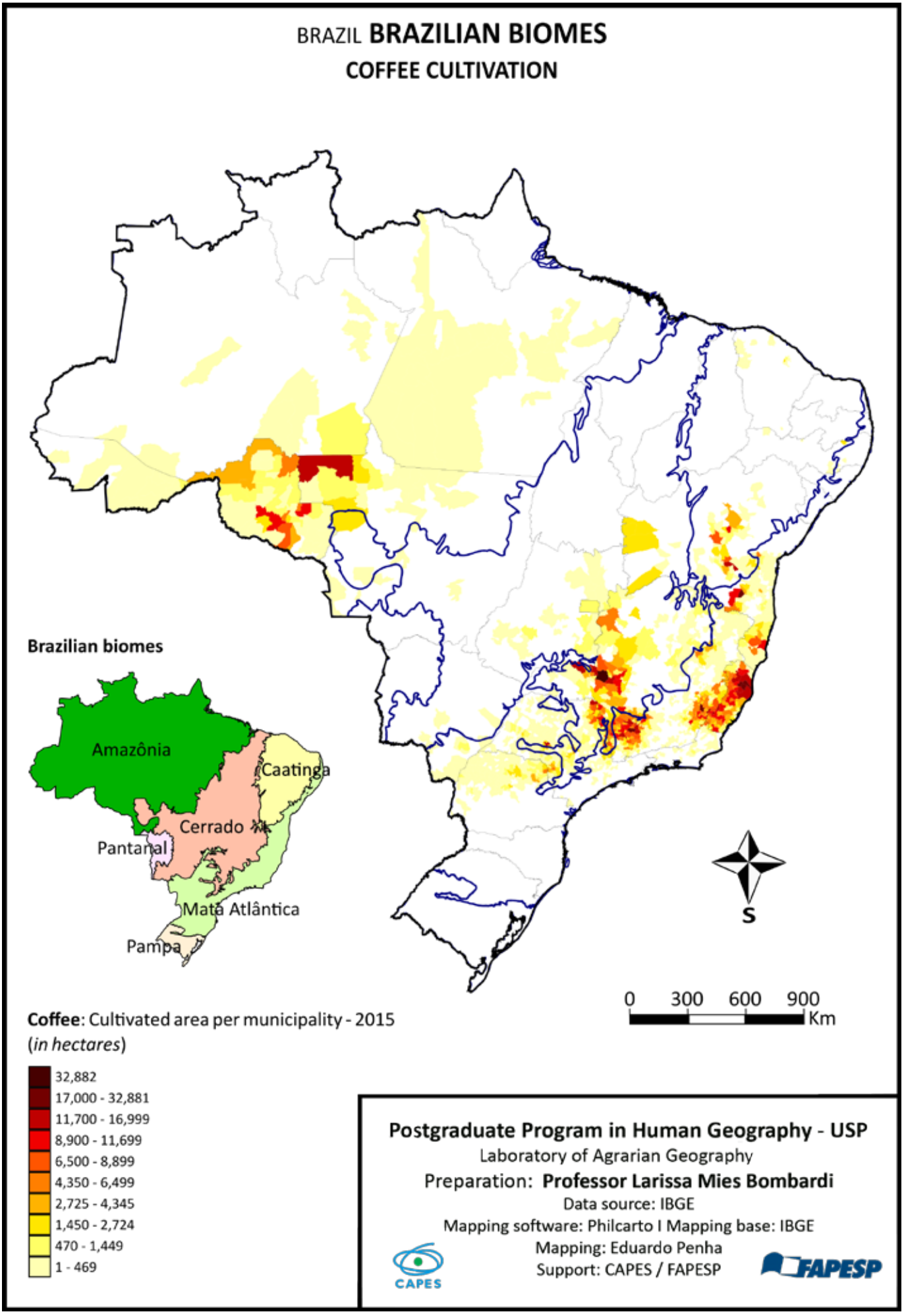

BRAZIL POISONING BY AGROTOXINS OF AGRICULTURAL USE
TYPE OF POISONING
Federation Units (2007-2014)
Number of poisoned individuals
3,723 [Paraná]
2,055 [São Paulo]
1,323 [Santa Catarina]
722 [Bahia]
324 [Mato Grosso do Sul]
1 [Amapá]
Poisoning according to the type
Acute - single case
Acute - repeated case
Chronic
Acute over chronic
Without information
Cases in relation to the population of the FU
(1:100,000 residents)
19,61 a 33,53
13,65 a 19,60
4,77 a 13,64
1,85 a 4,76
1,00 a 1,84
0,13 a 0,99
Without information
- Out of the 25,106 poisoning cases, 7,437 (29.6%) disregard the Federation Units and are not represented in this map.
S
0 300 600 900
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

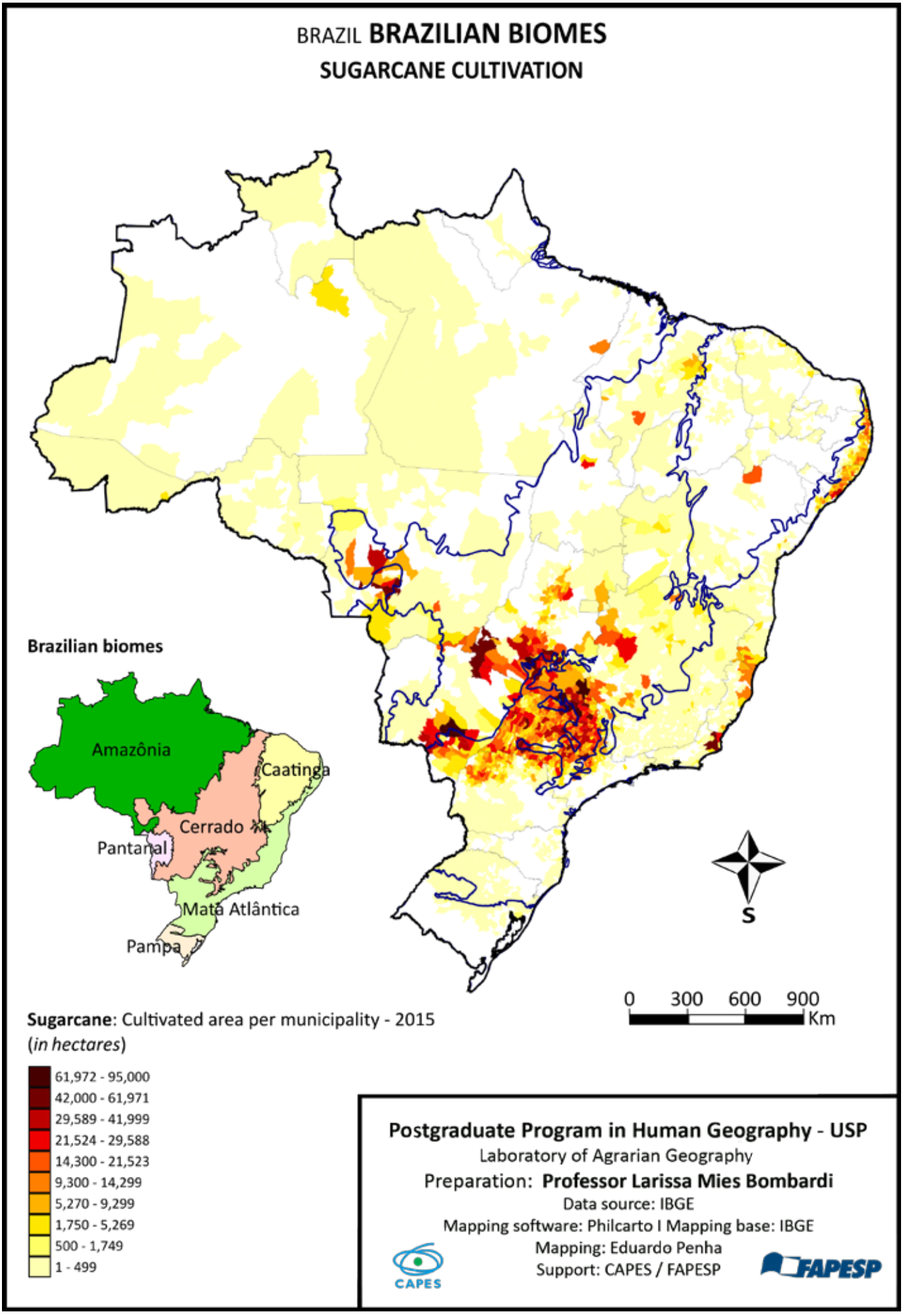
BRAZIL **BRAZILIAN BIOMES**

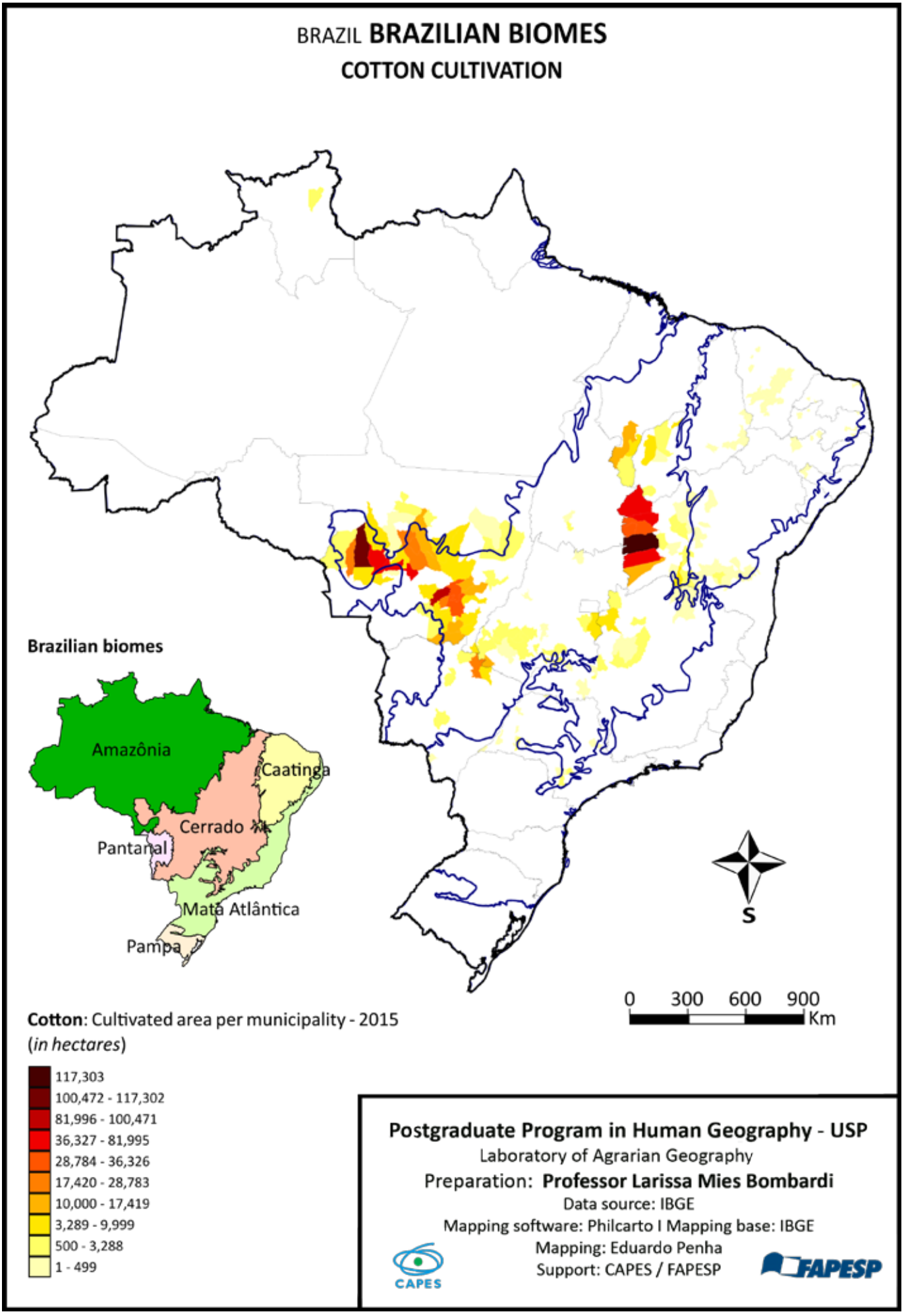

BRAZIL BRAZILIAN BIOMES
FEDERATION UNITS
RR
AP
AM
PA
MA
CE
RN
PI
PB
PE
AC
RO
TO
AL
SE
BA
MT
DF
GO
MG
MS
ES
SP
RJ
PR
SC
RS
S
0 300 600 900
Km
Biomes of Brazil
Amazônia
Cerrado
Mata Atlântica
Caatinga
Pampa
Pantanal
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

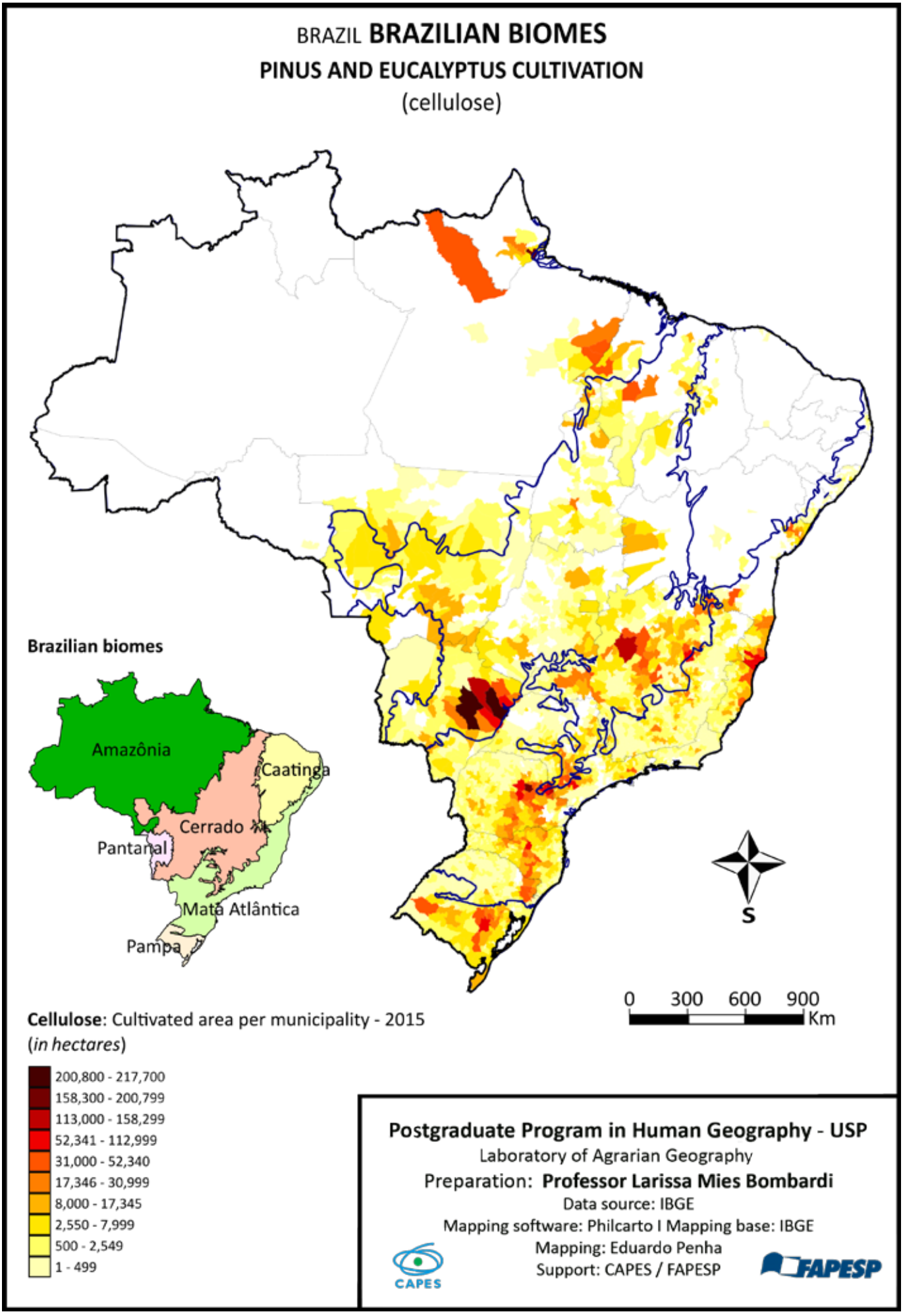

BRAZIL BRAZILIAN BIOMES
AGROTOXIN USE
Municipalities (Farms)
Amazônia
Caatinga
Cerrado
Pantanal
Mata Atlântica
Pampa
S
0 300 600 900
Km
Percentage of establishments using pesticides in relation to the total of establishments in the municipality
(%)
63.36 - 100
39.74 - 63.35
24.30 - 39.73
13.11 - 24.29
5.87 - 13.10
0.04 - 5.86
Without Use
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

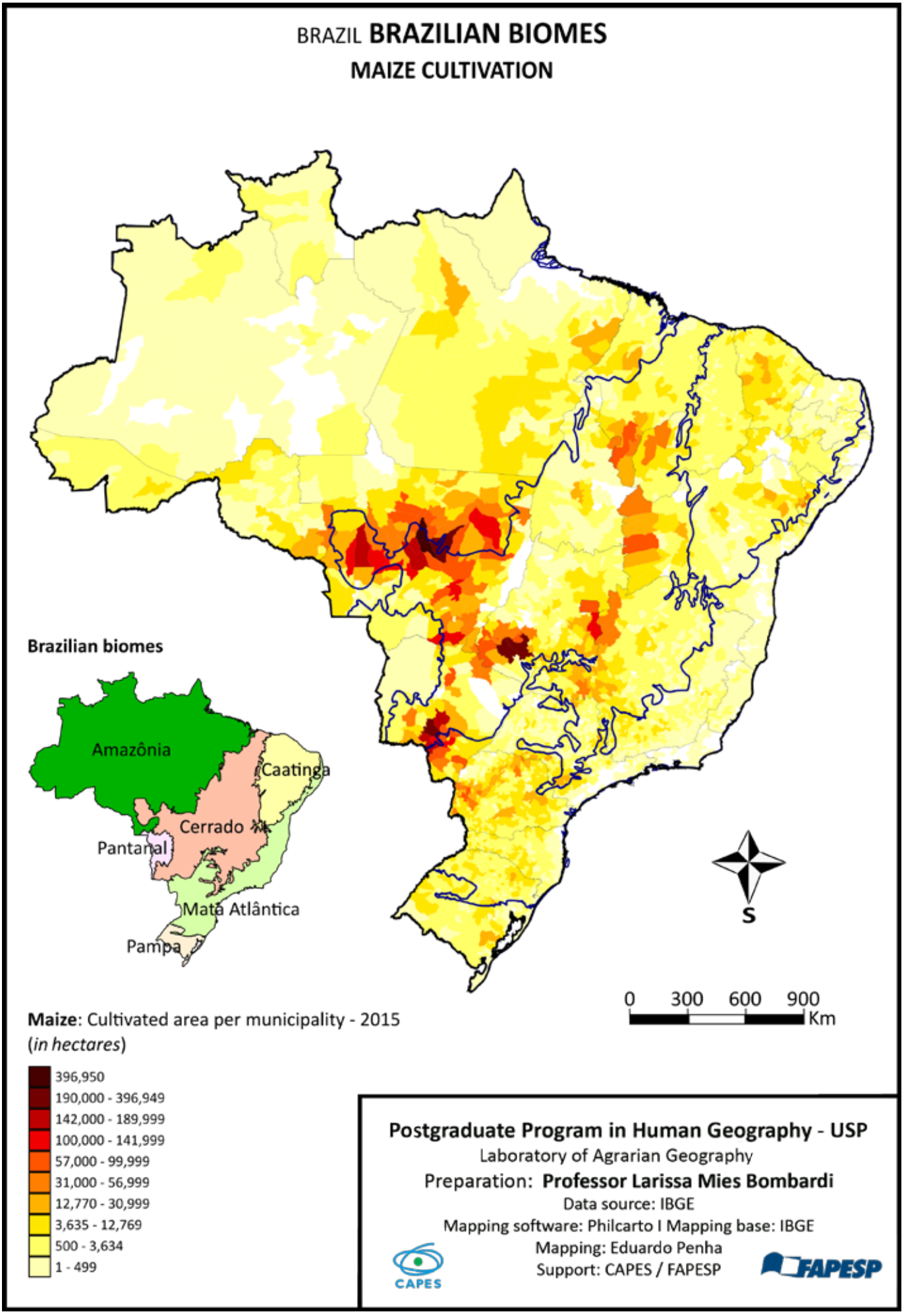

BRAZIL BRAZILIAN BIOMES
CITRUS CULTIVATION
(orange and lemon)
Brazilian biomes
Amazônia
Caatinga
Cerrado
Pantanal
Mata Atlântica
Pampa
S
0 300 600 900
Km
Citrus: Cultivated area per municipality - 2015
(in hectares)
19,100 - 20,475
11,407 - 19,099
7,157 - 11,406
4,980 - 7,156
3,753 - 4,979
2,675 - 3,752
1,680 - 2,674
801 - 1,679
230 - 800
1 - 229
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

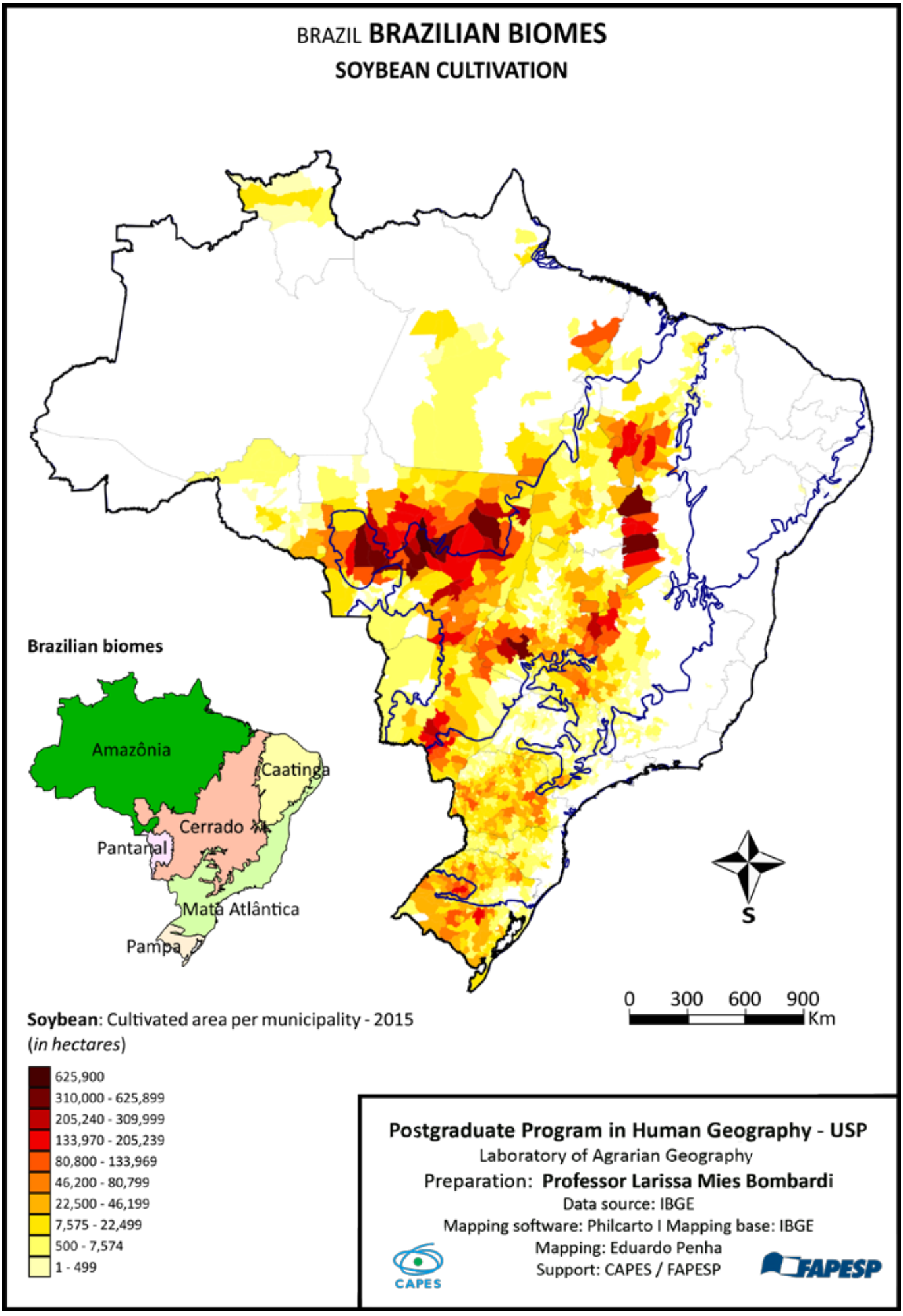

BRAZIL BRAZILIAN BIOMES
COFFEE CULTIVATION
Brazilian biomes
Amazônia
Caatinga
Cerrado
Pantanal
Mata Atlântica
Pampa
S
0 300 600 900
Km
Coffee: Cultivated area per municipality - 2015
(in hectares)
32,882
17,000 - 32,881
11,700 - 16,999
8,900 - 11,699
6,500 - 8,899
4,350 - 6,499
2,725 - 4,345
1,450 - 2,724
470 - 1,449
1 - 469
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL BRAZILIAN BIOMES
SUGARCANE CULTIVATION
Brazilian biomes
Amazônia
Caatinga
Cerrado
Pantanal
Mata Atlântica
Pampa
S
0 300 600 900
Km
Sugarcane: Cultivated area per municipality - 2015
(in hectares)
61,972 - 95,000
42,000 - 61,971
29,589 - 41,999
21,524 - 29,588
14,300 - 21,523
9,300 - 14,299
5,270 - 9,299
1,750 - 5,269
500 - 1,749
1 - 499
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

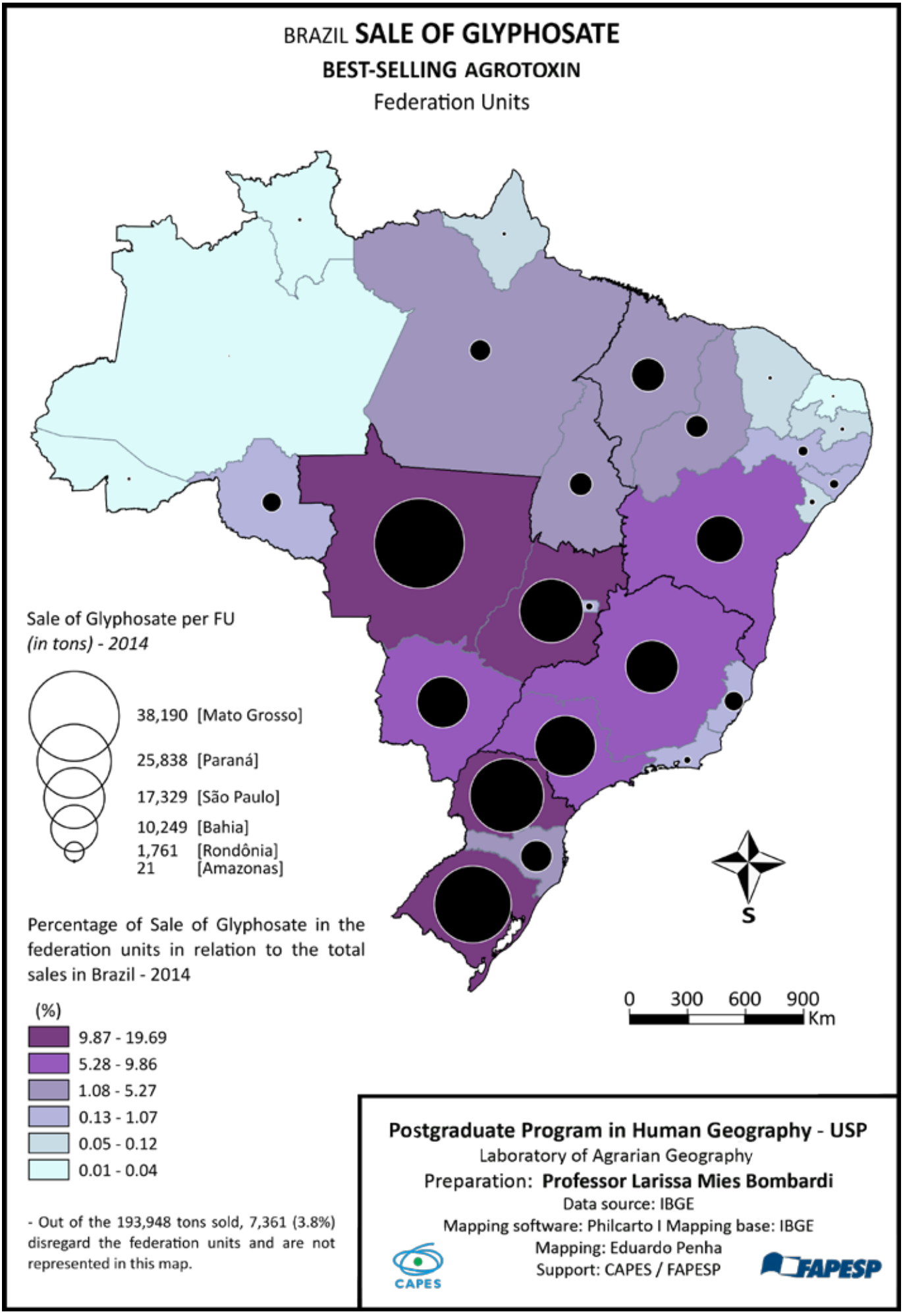

BRAZIL BRAZILIAN BIOMES
COTTON CULTIVATION
Brazilian biomes
Amazônia
Caatinga
Cerrado
Pantanal
Mata Atlântica
Pampa
S
0 300 600 900
Km
Cotton: Cultivated area per municipality - 2015
(in hectares)
117,303
100,472 - 117,302
81,996 - 100,471
36,327 - 81,995
28,784 - 36,326
17,420 - 28,783
10,000 - 17,419
3,289 - 9,999
500 - 3,288
1 - 499
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

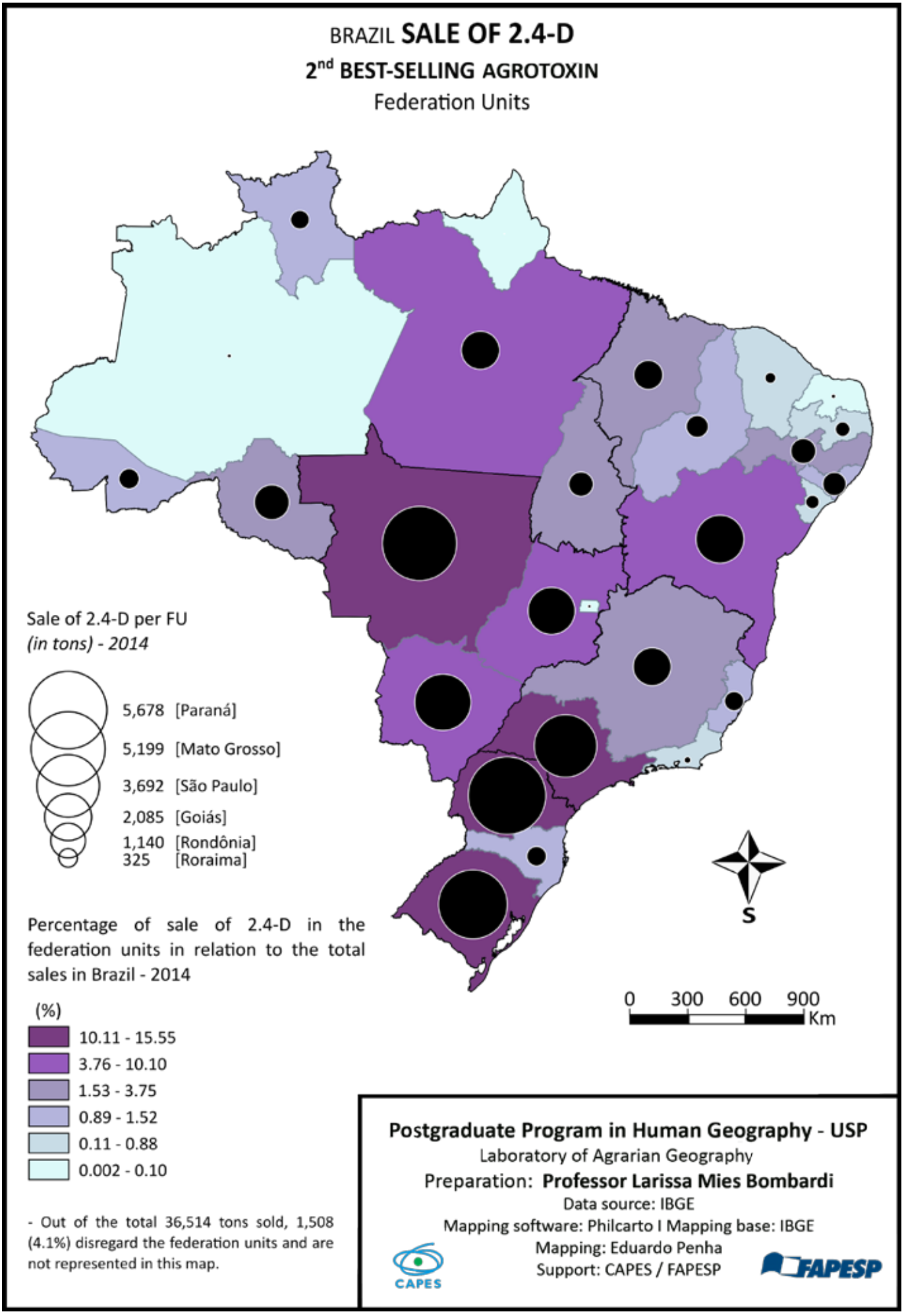

BRAZIL BRAZILIAN BIOMES
PINUS AND EUCALYPTUS CULTIVATION
(cellulose)
Brazilian biomes
Amazônia
Caatinga
Cerrado
Pantanal
Mata Atlântica
Pampa
S
0 300 600 900
Km
Cellulose: Cultivated area per municipality - 2015
(in hectares)
200,800 - 217,700
158,300 - 200,799
113,000 - 158,299
52,341 - 112,999
31,000 - 52,340
17,346 - 30,999
8,000 - 17,345
2,550 - 7,999
500 - 2,549
1 - 499
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

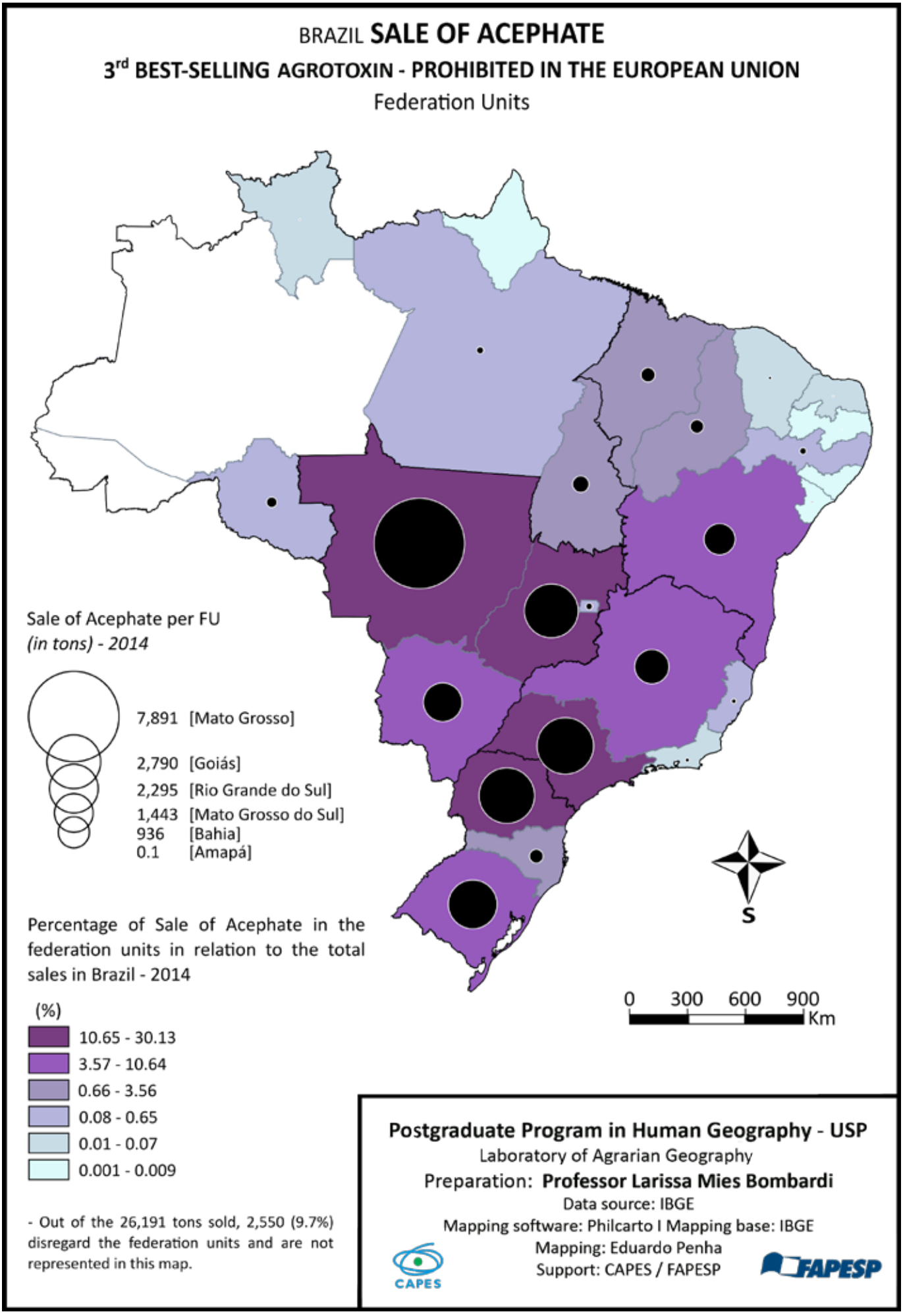

BRAZIL BRAZILIAN BIOMES
MAIZE CULTIVATION
Brazilian biomes
Amazônia
Caatinga
Cerrado
Pantanal
Mata Atlântica
Pampa
S
0 300 600 900
Km
Maize: Cultivated area per municipality - 2015
(in hectares)
396,950
190,000 - 396,949
142,000 - 189,999
100,000 - 141,999
57,000 - 99,999
31,000 - 56,999
12,770 - 30,999
3,635 - 12,769
500 - 3,634
1 - 499
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

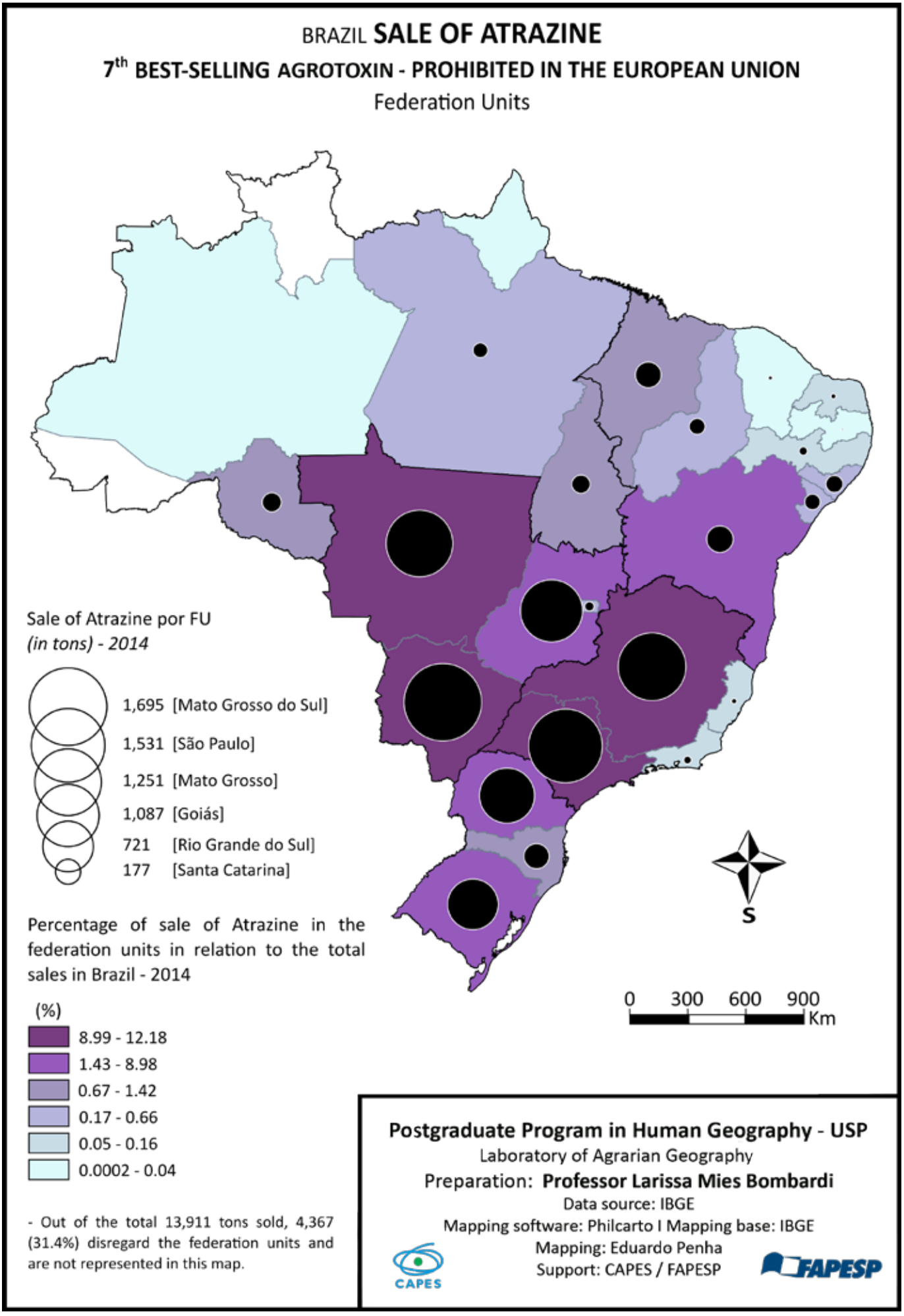

BRAZIL BRAZILIAN BIOMES
SOYBEAN CULTIVATION
Brazilian biomes
Amazônia
Caatinga
Cerrado
Pantanal
Mata Atlântica
Pampa
S
0 300 600 900
Km
Soybean: Cultivated area per municipality - 2015
(in hectares)
625,900
310,000 - 625,899
205,240 - 309,999
133,970 - 205,239
80,800 - 133,969
46,200 - 80,799
22,500 - 46,199
7,575 - 22,499
500 - 7,574
1 - 499
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

BRAZIL **AGROTOXIN SALES**


BRAZIL SALE OF GLYPHOSATE
BEST-SELLING AGROTOXIN
Federation Units
Sale of Glyphosate per FU
(in tons) - 2014
38,190 [Mato Grosso]
25,838 [Paraná]
17,329 [São Paulo]
10,249 [Bahia]
1,761 [Rondônia]
21 [Amazonas]
S
0 300 600 900
Km
Percentage of Sale of Glyphosate in the federation units in relation to the total sales in Brazil - 2014
(%)
9.87 - 19.69
5.28 - 9.86
1.08 - 5.27
0.13 - 1.07
0.05 - 0.12
0.01 - 0.04
- Out of the 193,948 tons sold, 7,361 (3.8%) disregard the federation units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

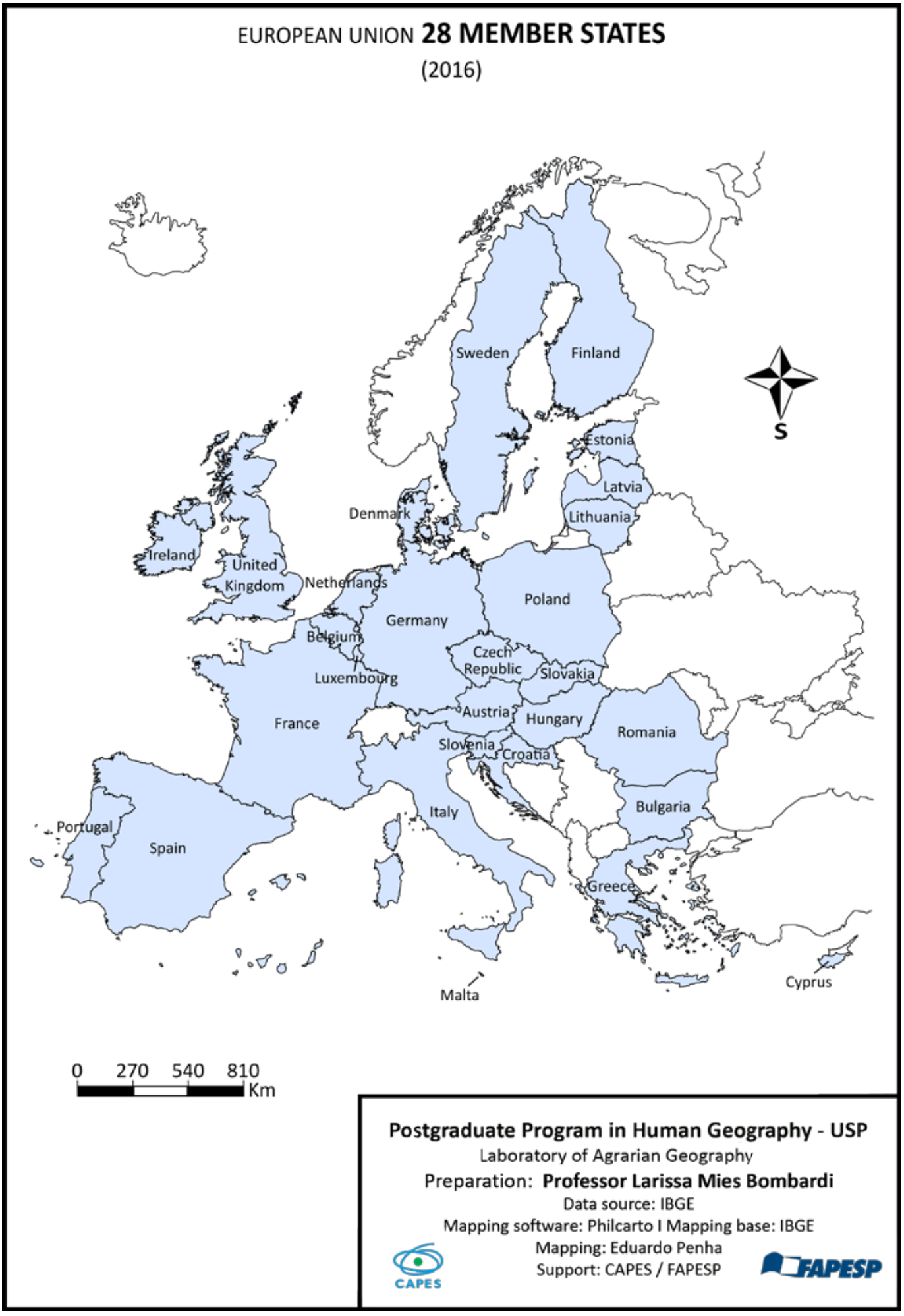

BRAZIL SALE OF 2.4-D
2nd BEST-SELLING AGROTOXIN
Federation Units
Sale of 2.4-D per FU
(in tons) - 2014
5,678 [Paraná]
5,199 [Mato Grosso]
3,692 [São Paulo]
2,085 [Goiás]
1,140 [Rondônia]
325 [Roraima]
S
0 300 600 900
Km
Percentage of sale of 2.4-D in the federation units in relation to the total sales in Brazil - 2014
(%)
10.11 - 15.55
3.76 - 10.10
1.53 - 3.75
0.89 - 1.52
0.11 - 0.88
0.002 - 0.10
- Out of the total 36,514 tons sold, 1,508 (4.1%) disregard the federation units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL SALE OF ACEPHATE
3rd BEST-SELLING AGROTOXIN - PROHIBITED IN THE EUROPEAN UNION
Federation Units
Sale of Acephate per FU
(in tons) - 2014
7,891 [Mato Grosso]
2,790 [Goiás]
2,295 [Rio Grande do Sul]
1,443 [Mato Grosso do Sul]
936 [Bahia]
0.1 [Amapá]
S
0 300 600 900
Km
Percentage of Sale of Acephate in the federation units in relation to the total sales in Brazil - 2014
(%)
10.65 - 30.13
3.57 - 10.64
0.66 - 3.56
0.08 - 0.65
0.01 - 0.07
0.001 - 0.009
- Out of the 26,191 tons sold, 2,550 (9.7%) disregard the federation units and are not represented in this map.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL SALE OF ATRAZINE
7th BEST-SELLING AGROTOXIN - PROHIBITED IN THE EUROPEAN UNION
Federation Units
Sale of Atrazine por FU
(in tons) - 2014
1,695 [Mato Grosso do Sul]
1,531 [São Paulo]
1,251 [Mato Grosso]
1,087 [Goiás]
721 [Rio Grande do Sul]
177 [Santa Catarina]
Percentage of sale of Atrazine in the federation units in relation to the total sales in Brazil - 2014
(%)
8.99 - 12.18
1.43 - 8.98
0.67 - 1.42
0.17 - 0.66
0.05 - 0.16
0.0002 - 0.04
- Out of the total 13,911 tons sold, 4,367 (31.4%) disregard the federation units and are not represented in this map.
S
0 300 600 900
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

BRAZIL **CONNECTIONS TO THE EUROPEAN UNION**

BRAZIL **EXPORTS TO THE EUROPEAN UNION**

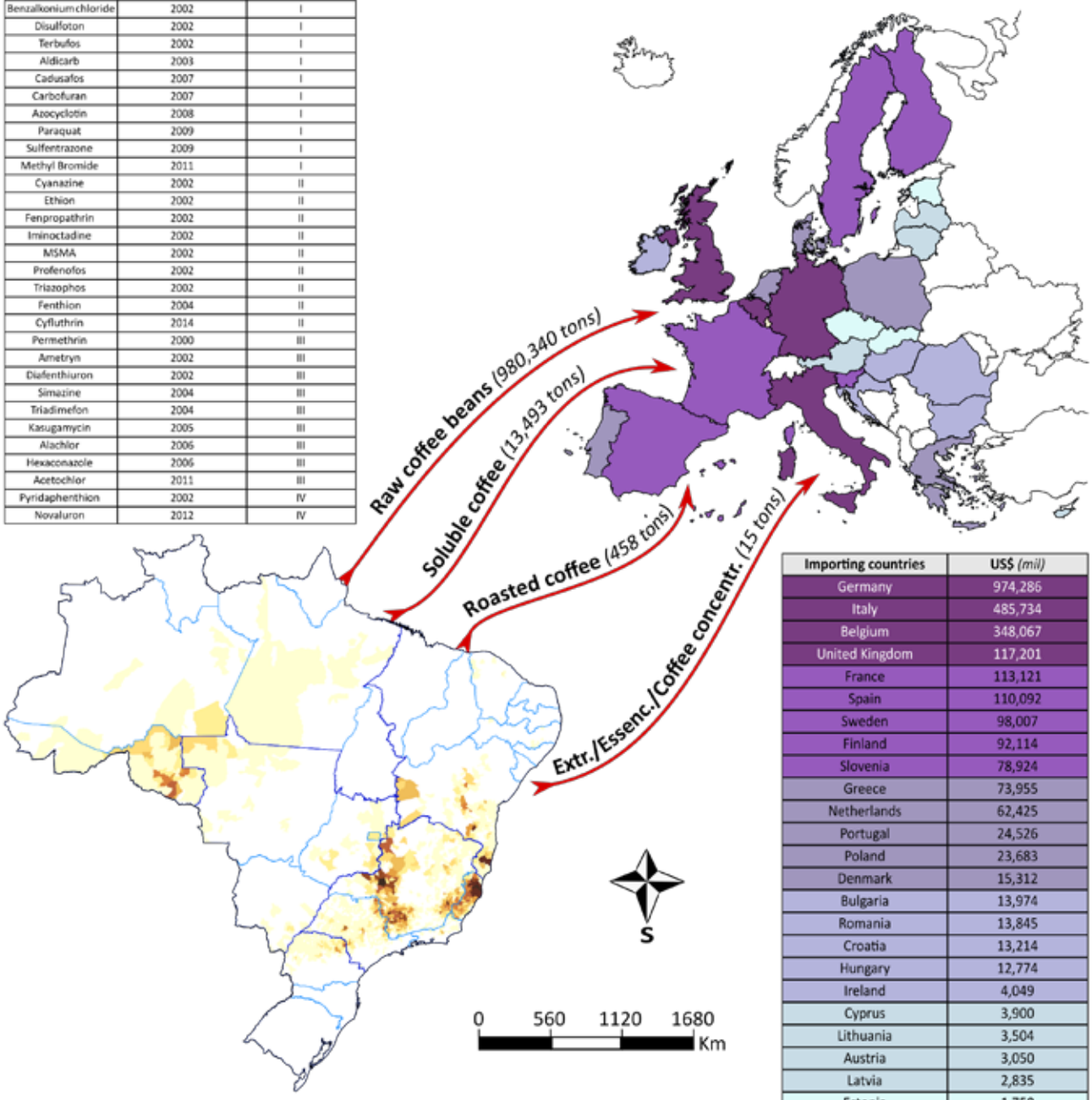

EUROPEAN UNION 28 MEMBER STATES
(2016)
Sweden
Finland
Estonia
Latvia
Lithuania
Denmark
Ireland
United Kingdom
Netherlands
Germany
Belgium
Luxembourg
France
Poland
Czech Republic
Slovakia
Austria
Hungary
Romania
Slovenia
Croatia
Bulgaria
Italy
Portugal
Spain
Greece
Malta
Cyprus
S
0 270 540 810
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF COFFEE**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Benzalkonium chloride	2002	I
Disulfoton	2002	I
Terbufos	2002	I
Aldicarb	2003	I
Cadusafos	2007	I
Carbofuran	2007	I
Azocyclotin	2008	I
Paraquat	2009	I
Sulfentrazone	2009	I
Methyl Bromide	2011	I
Cyanazine	2002	II
Ethion	2002	II
Fenpropathrin	2002	II
Iminoctadine	2002	II
MSMA	2002	II
Profenofos	2002	II
Triazophos	2002	II
Fenthion	2004	II
Cyfluthrin	2014	II
Permethrin	2000	III
Ametryn	2002	III
Diafenthiuron	2002	III
Simazine	2004	III
Triadimefon	2004	III
Kasugamycin	2005	III
Alachlor	2006	III
Hexaconazole	2006	III
Acetochlor	2011	III
Pyridaphenthion	2002	IV
Novaluron	2012	IV



Importing countries	US$ *(mil)*
Germany	974,286
Italy	485,734
Belgium	348,067
United Kingdom	117,201
France	113,121
Spain	110,092
Sweden	98,007
Finland	92,114
Slovenia	78,924
Greece	73,955
Netherlands	62,425
Portugal	24,526
Poland	23,683
Denmark	15,312
Bulgaria	13,974
Romania	13,845
Croatia	13,214
Hungary	12,774
Ireland	4,049
Cyprus	3,900
Lithuania	3,504
Austria	3,050
Latvia	2,835
Estonia	1,750
Malta	951
Czech Republic	650
Slovakia	402
Countries which did not import the product in 2016	

Municipalities producing coffee in 2015
(in tons)

- 31,960 - 41,085
- 21,440 - 31,959
- 15,624 - 21,439
- 12,420 - 15,623
- 9,000 - 12,419
- 6,195 - 8,999
- 3,840 - 6,194
- 2,100 - 3,839
- 706 - 2,099
- 1 - 705

- Out of the 121 pesticides authorized for the cultivation of Brazilian coffee, 30 are prohibited in the European Union.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**

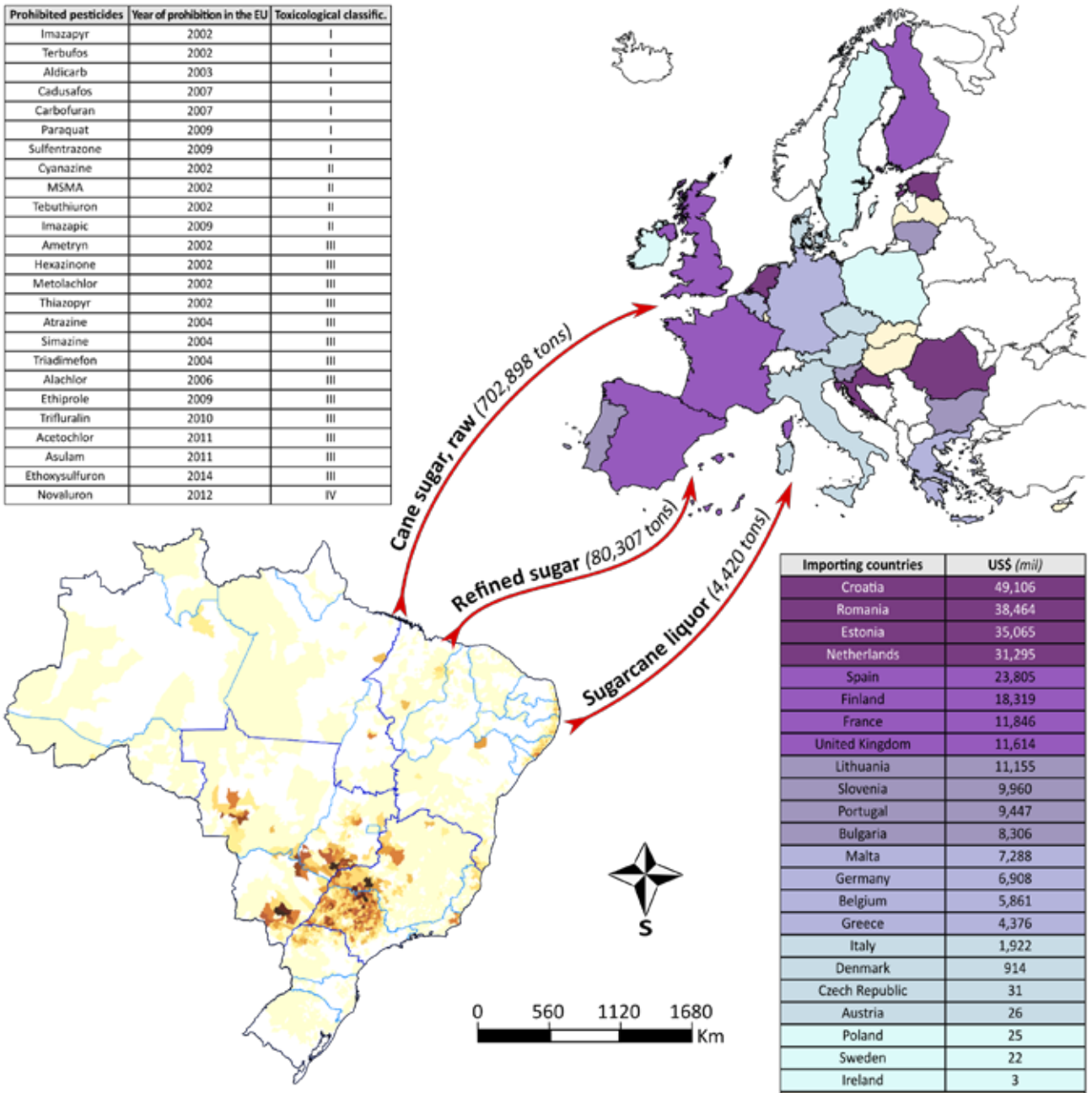
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF SUGARCANE**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Imazapyr	2002	I
Terbufos	2002	I
Aldicarb	2003	I
Cadusafos	2007	I
Carbofuran	2007	I
Paraquat	2009	I
Sulfentrazone	2009	I
Cyanazine	2002	II
MSMA	2002	II
Tebuthiuron	2002	II
Imazapic	2009	II
Ametryn	2002	III
Hexazinone	2002	III
Metolachlor	2002	III
Thiazopyr	2002	III
Atrazine	2004	III
Simazine	2004	III
Triadimefon	2004	III
Alachlor	2006	III
Ethiprole	2009	III
Trifluralin	2010	III
Acetochlor	2011	III
Asulam	2011	III
Ethoxysulfuron	2014	III
Novaluron	2012	IV



Importing countries	US$ *(mil)*
Croatia	49,106
Romania	38,464
Estonia	35,065
Netherlands	31,295
Spain	23,805
Finland	18,319
France	11,846
United Kingdom	11,614
Lithuania	11,155
Slovenia	9,960
Portugal	9,447
Bulgaria	8,306
Malta	7,288
Germany	6,908
Belgium	5,861
Greece	4,376
Italy	1,922
Denmark	914
Czech Republic	31
Austria	26
Poland	25
Sweden	22
Ireland	3
Countries which did not import the product in 2016	

Municipalities producing sugarcane in 2015 *(in tons)*

- 6,266,200 - 7,600,000
- 4,604,000 - 6,266,199
- 3,226,500 - 4,603,999
- 2,480,000 - 3,226,499
- 1,802,000 - 2,479,999
- 1,260,000 - 1,801,999
- 821,590 - 1,259,999
- 435,609 - 821,589
- 142,460 - 435,608
- 7 - 142,459

- Out of the 85 pesticides authorized for the cultivation of Brazilian sugarcane, 25 are prohibited in the European Union.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

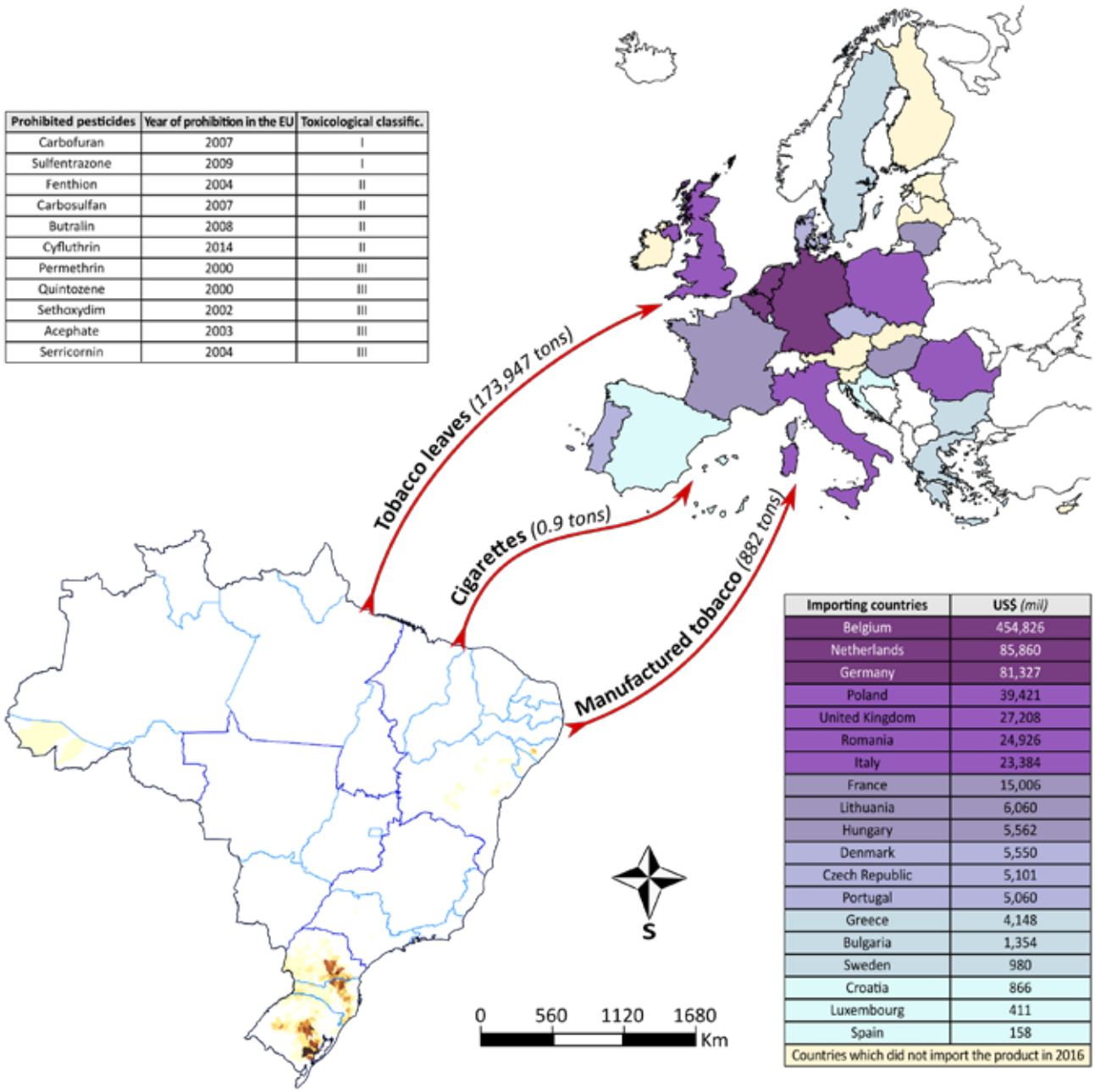
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF TOBACCO**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Carbofuran	2007	I
Sulfentrazone	2009	I
Fenthion	2004	II
Carbosulfan	2007	II
Butralin	2008	II
Cyfluthrin	2014	II
Permethrin	2000	III
Quintozene	2000	III
Sethoxydim	2002	III
Acephate	2003	III
Serricornin	2004	III



Importing countries	US$ *(mil)*
Belgium	454,826
Netherlands	85,860
Germany	81,327
Poland	39,421
United Kingdom	27,208
Romania	24,926
Italy	23,384
France	15,006
Lithuania	6,060
Hungary	5,562
Denmark	5,550
Czech Republic	5,101
Portugal	5,060
Greece	4,148
Bulgaria	1,354
Sweden	980
Croatia	866
Luxembourg	411
Spain	158
Countries which did not import the product in 2016	

Municipalities producing tobacco in 2015
(in tons)

- 22,000 - 24,200
- 19,200 - 21,999
- 12,040 - 19,199
- 8,979 - 12,039
- 6,300 - 8,978
- 4,320 - 6,299
- 2,800 - 4,319
- 1,400 - 2,799
- 480 - 1,399
- 1 - 479

- Out of the 55 pesticides authorized for the cultivation of Brazilian tobacco, 11 are prohibited in the European Union.

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Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE
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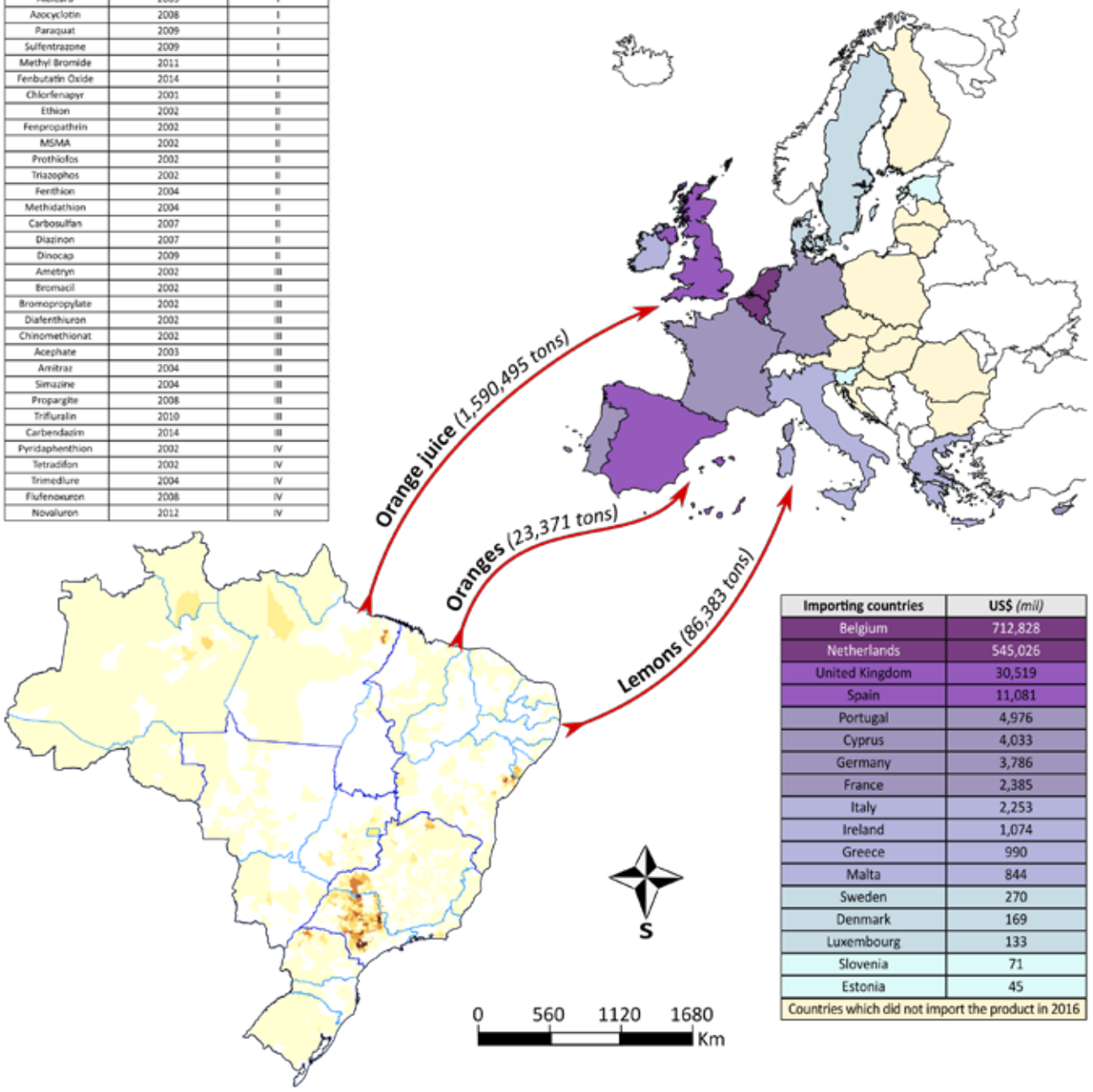
Mapping: Eduardo Penha
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF CITRUS**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Aldicarb	2003	I
Azocyclotin	2008	I
Paraquat	2009	I
Sulfentrazone	2009	I
Methyl Bromide	2011	I
Fenbutatin Oxide	2014	I
Chlorfenapyr	2001	II
Ethion	2002	II
Fenpropathrin	2002	II
MSMA	2002	II
Prothiofos	2002	II
Triazophos	2002	II
Fenthion	2004	II
Methidathion	2004	II
Carbosulfan	2007	II
Diazinon	2007	II
Dinocap	2009	II
Ametryn	2002	III
Bromacil	2002	III
Bromopropylate	2002	III
Diafenthiuron	2002	III
Chinomethionat	2002	III
Acephate	2003	III
Amitraz	2004	III
Simazine	2004	III
Propargite	2008	III
Trifluralin	2010	III
Carbendazim	2014	III
Pyridaphenthion	2002	IV
Tetradifon	2002	IV
Trimedlure	2004	IV
Flufenoxuron	2008	IV
Novaluron	2012	IV



Importing countries	US$ *(mil)*
Belgium	712,828
Netherlands	545,026
United Kingdom	30,519
Spain	11,081
Portugal	4,976
Cyprus	4,033
Germany	3,786
France	2,385
Italy	2,253
Ireland	1,074
Greece	990
Malta	844
Sweden	270
Denmark	169
Luxembourg	133
Slovenia	71
Estonia	45
Countries which did not import the product in 2016	

Municipalities producing oranges and lemons in 2015 *(in tons)*

- 697,390
- 374,042 - 697,389
- 287,980 - 374,041
- 237,735 - 287,979
- 142,900 - 237,734
- 86,091 - 142,899
- 50,490 - 86,090
- 25,023 - 50,489
- 7,272 - 25,022
- 1 - 7,271

- Out of the 116 pesticides authorized for the cultivation of Brazilian oranges and lemons, 33 are prohibited in the European Union.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

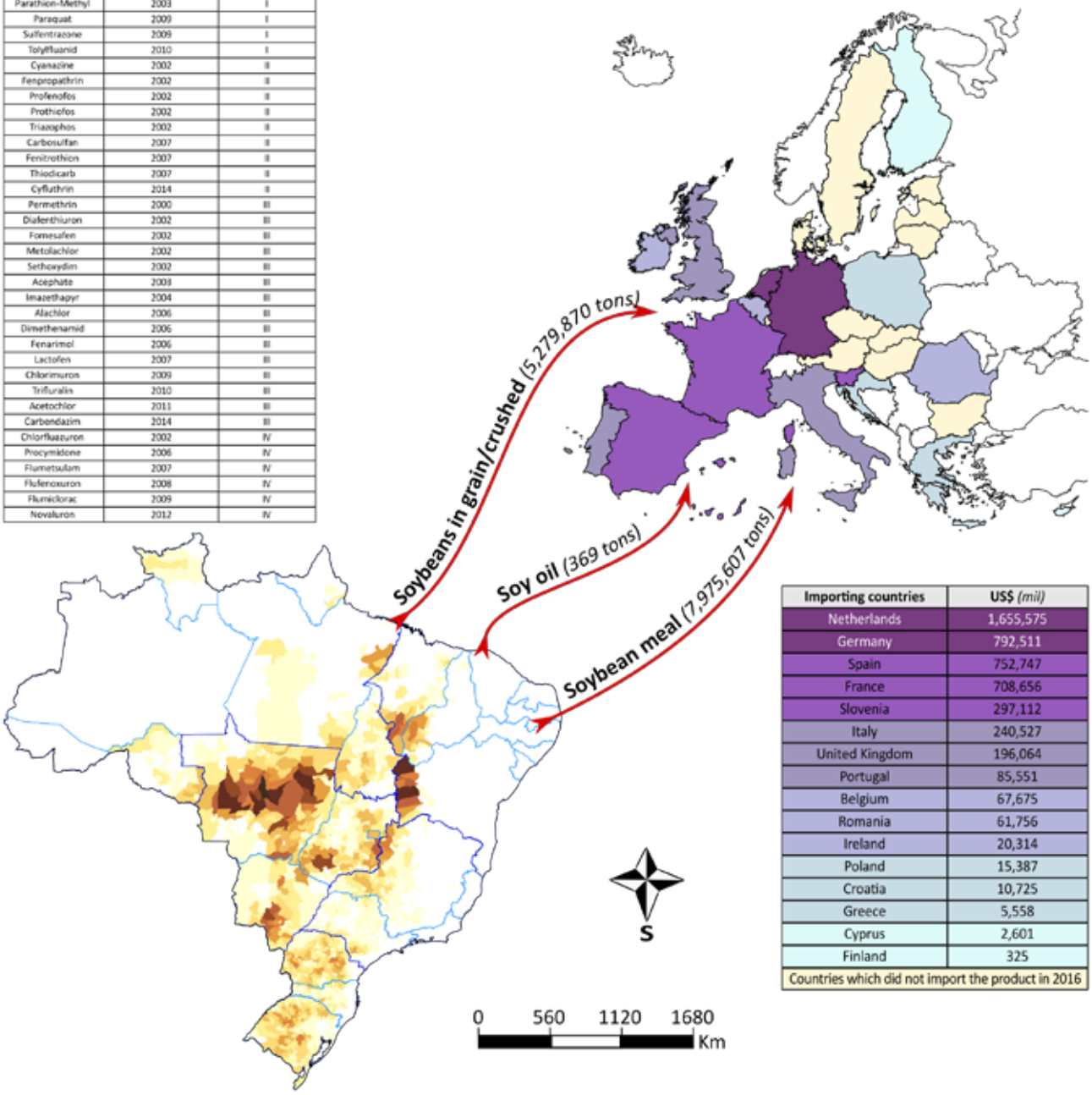
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF SOYBEAN**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Acifluorfen	2002	I
Parathion-Methyl	2003	I
Paraquat	2009	I
Sulfentrazone	2009	I
Tolylfluanid	2010	I
Cyanazine	2002	II
Fenpropathrin	2002	II
Profenofos	2002	II
Prothiofos	2002	II
Triazophos	2002	II
Carbosulfan	2007	II
Fenitrothion	2007	II
Thiodicarb	2007	II
Cyfluthrin	2014	II
Permethrin	2000	III
Diafenthiuron	2002	III
Fomesafen	2002	III
Metolachlor	2002	III
Sethoxydim	2002	III
Acephate	2003	III
Imazethapyr	2004	III
Alachlor	2006	III
Dimethenamid	2006	III
Fenarimol	2006	III
Lactofen	2007	III
Chlorimuron	2009	III
Trifluralin	2010	III
Acetochlor	2011	III
Carbendazim	2014	III
Chlorfluazuron	2002	IV
Procymidone	2006	IV
Flumetsulam	2007	IV
Flufenoxuron	2008	IV
Flumiclorac	2009	IV
Novaluron	2012	IV



Importing countries	US$ *(mil)*
Netherlands	1,655,575
Germany	792,511
Spain	752,747
France	708,656
Slovenia	297,112
Italy	240,527
United Kingdom	196,064
Portugal	85,551
Belgium	67,675
Romania	61,756
Ireland	20,314
Poland	15,387
Croatia	10,725
Greece	5,558
Cyprus	2,601
Finland	325
Countries which did not import the product in 2016	

Municipalities producing soybean in 2015 *(in tons)*

- 1,951,710
- 995,960 - 1,951,709
- 654,060 - 995,959
- 501,000 - 654,059
- 333,840 - 500,999
- 205,660 - 333,839
- 115,128 - 205,659
- 58,809 - 115,127
- 20,488 - 58,808
- 2 - 20,487

- Out of the 150 pesticides authorized for the cultivation of Brazilian soybean, 35 are prohibited in the European Union.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

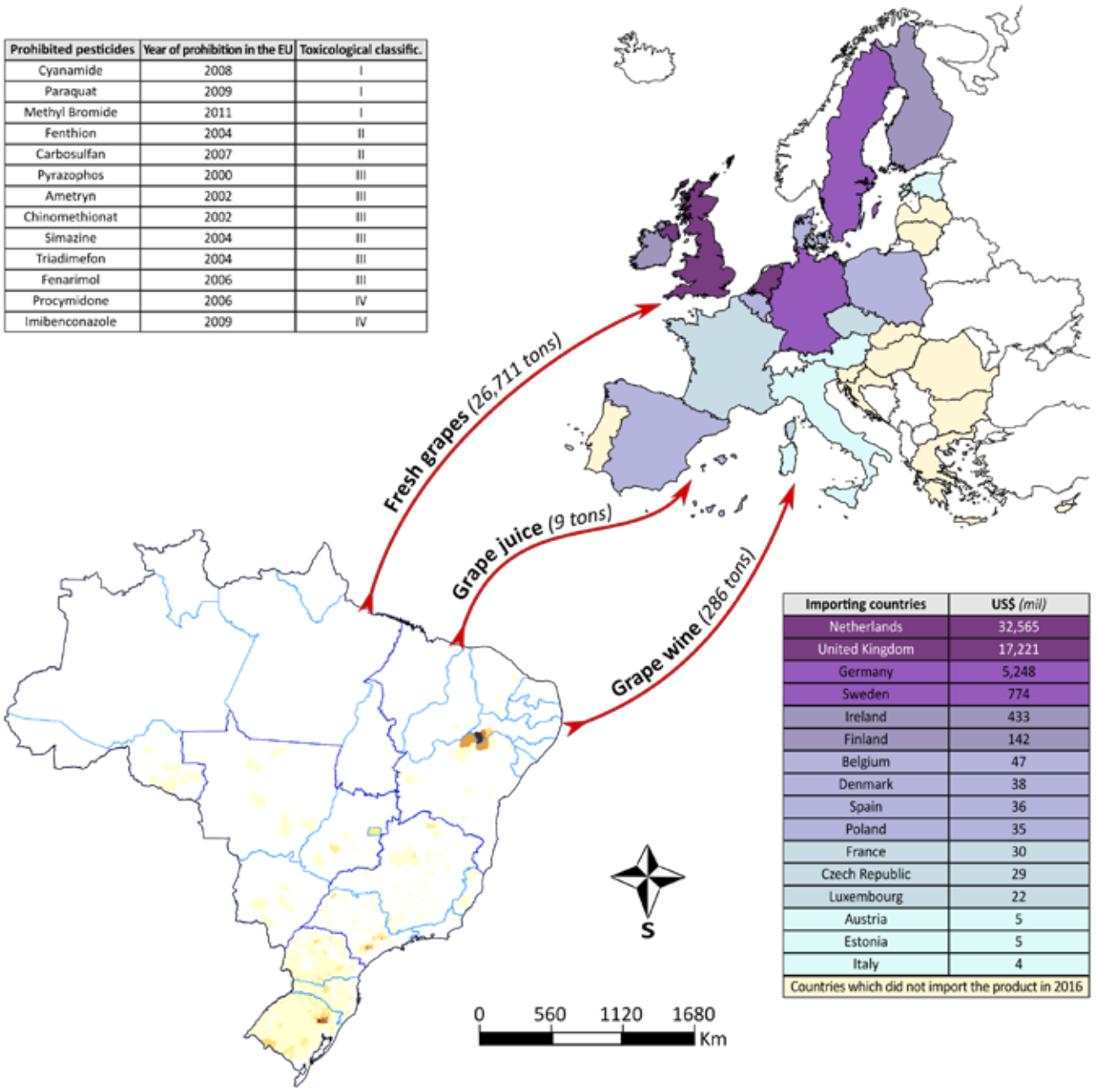
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF GRAPE**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Cyanamide	2008	I
Paraquat	2009	I
Methyl Bromide	2011	I
Fenthion	2004	II
Carbosulfan	2007	II
Pyrazophos	2000	III
Ametryn	2002	III
Chinomethionat	2002	III
Simazine	2004	III
Triadimefon	2004	III
Fenarimol	2006	III
Procymidone	2006	IV
Imibenconazole	2009	IV



Importing countries	US$ *(mil)*
Netherlands	32,565
United Kingdom	17,221
Germany	5,248
Sweden	774
Ireland	433
Finland	142
Belgium	47
Denmark	38
Spain	36
Poland	35
France	30
Czech Republic	29
Luxembourg	22
Austria	5
Estonia	5
Italy	4
Countries which did not import the product in 2016	

Municipalities producing grape in 2015
(in tons)

- 162,448
- 104,200 - 162,447
- 90,460 - 104,199
- 64,500 - 90,459
- 44,688 - 64,499
- 30,000 - 44,687
- 16,450 - 29,999
- 5,250 - 16,449
- 1,068 - 5,249
- 2 - 1,067

- Out of the 71 pesticides authorized for the cultivation of Brazilian grape, 13 are prohibited in the European Union.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**

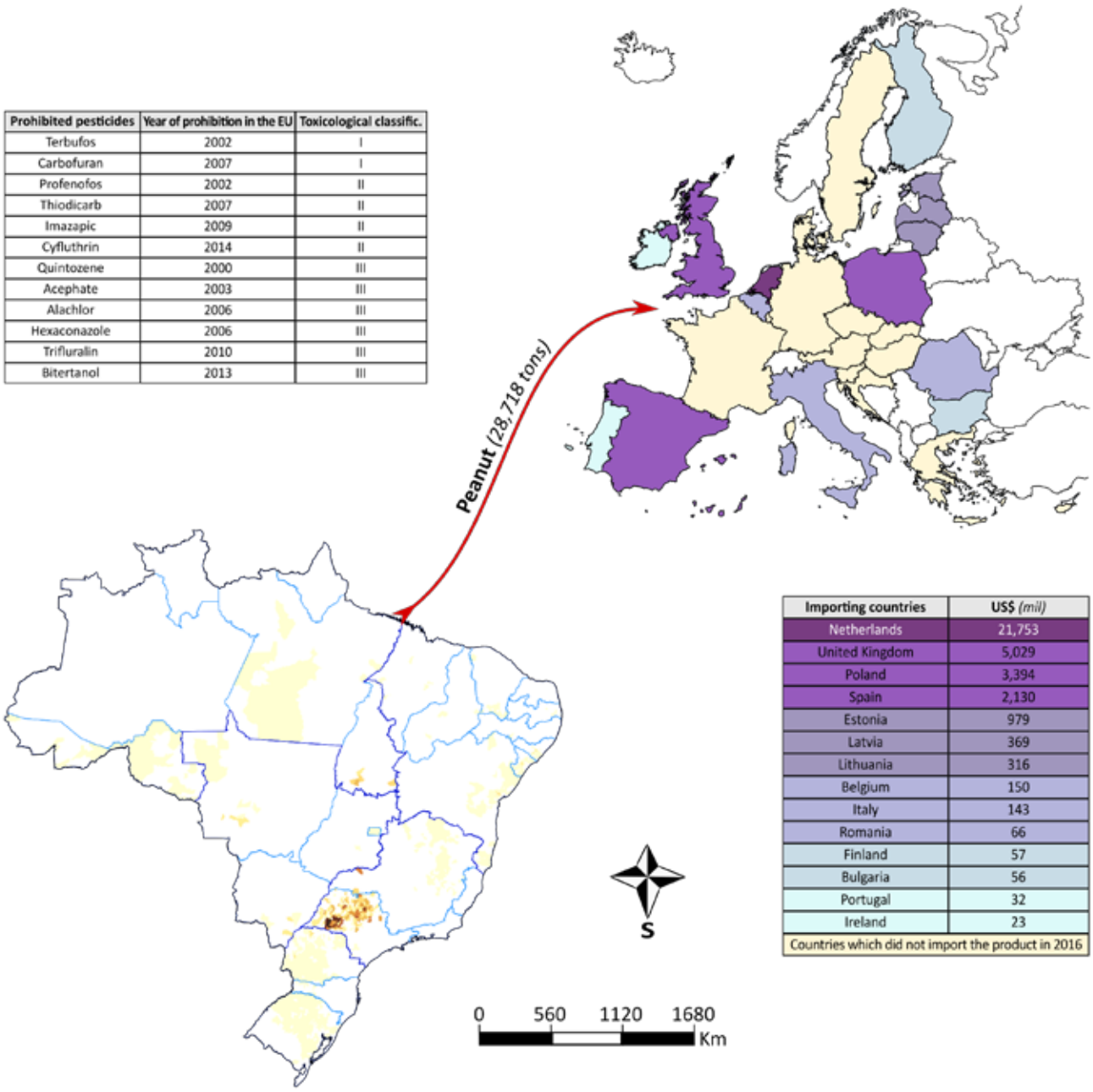
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF PEANUT**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Terbufos	2002	I
Carbofuran	2007	I
Profenofos	2002	II
Thiodicarb	2007	II
Imazapic	2009	II
Cyfluthrin	2014	II
Quintozene	2000	III
Acephate	2003	III
Alachlor	2006	III
Hexaconazole	2006	III
Trifluralin	2010	III
Bitertanol	2013	III



Importing countries	US$ *(mil)*
Netherlands	21,753
United Kingdom	5,029
Poland	3,394
Spain	2,130
Estonia	979
Latvia	369
Lithuania	316
Belgium	150
Italy	143
Romania	66
Finland	57
Bulgaria	56
Portugal	32
Ireland	23
Countries which did not import the product in 2016	

Municipalities producing peanut in 2015
(in tons)

- 22,255
- 15,000 - 22,254
- 11,250 - 14,999
- 8,250 - 11,249
- 6,588 - 8,249
- 4,200 - 6,587
- 2,399 - 4,199
- 1,125 - 2,398
- 315 - 1,124
- 1 - 314

- Out of the 56 pesticides authorized for the cultivation of Brazilian peanut, 12 are prohibited in the European Union.

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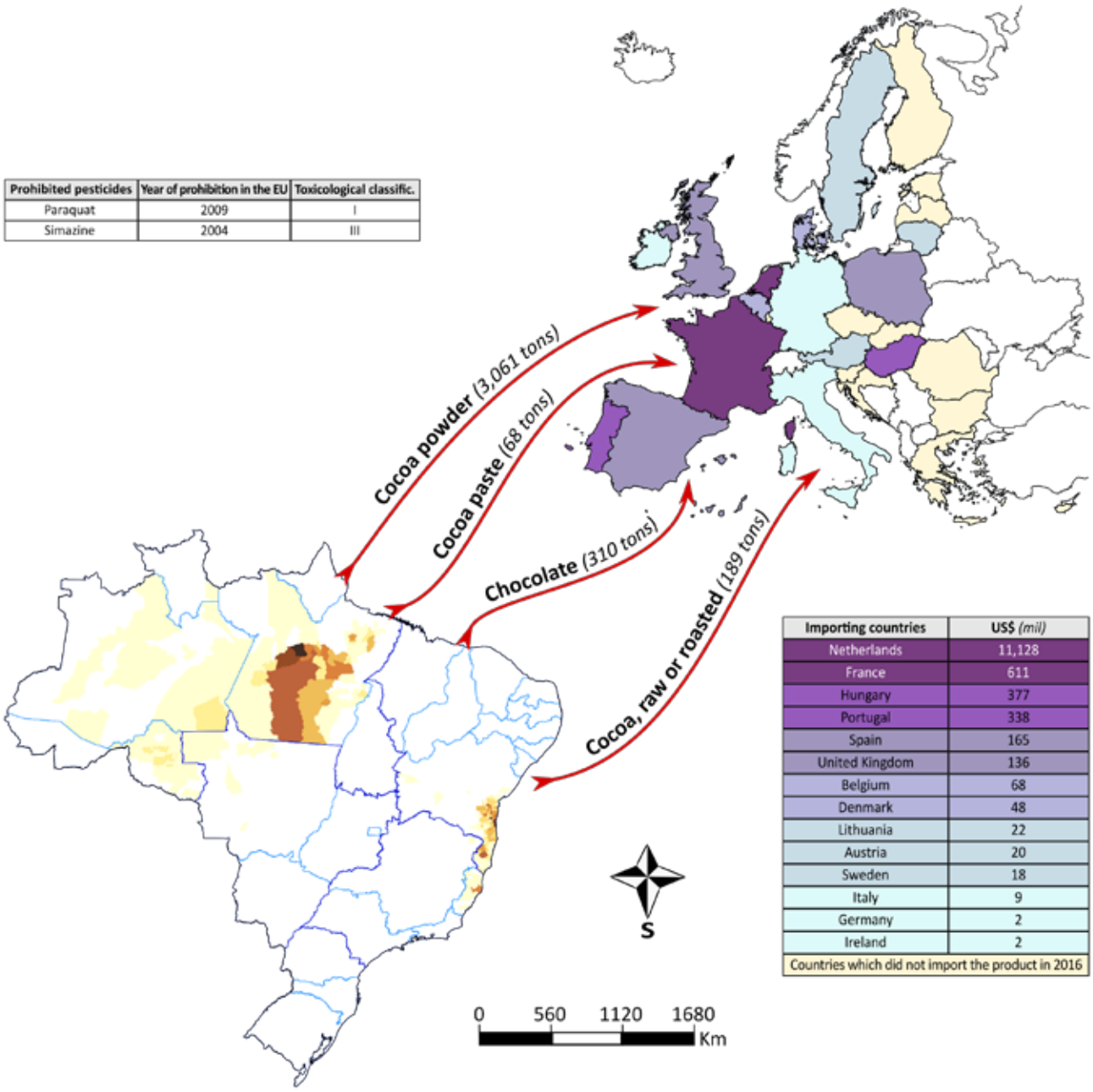
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF COCOA**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)



Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Paraquat	2009	I
Simazine	2004	III

Importing countries	US$ *(mil)*
Netherlands	11,128
France	611
Hungary	377
Portugal	338
Spain	165
United Kingdom	136
Belgium	68
Denmark	48
Lithuania	22
Austria	20
Sweden	18
Italy	9
Germany	2
Ireland	2
Countries which did not import the product in 2016	

Municipalities producing cocoa in 2015
(in tons)

- 41,868
- 13,160 - 41,867
- 8,317 - 13,159
- 5,263 - 8,316
- 3,868 - 5,262
- 3,084 - 3,867
- 2,231 - 3,083
- 1,292 - 2,230
- 444 - 1,291
- 1 - 443

- Out of the 24 pesticides authorized for the cultivation of Brazilian cocoa, 2 are prohibited in the European Union.

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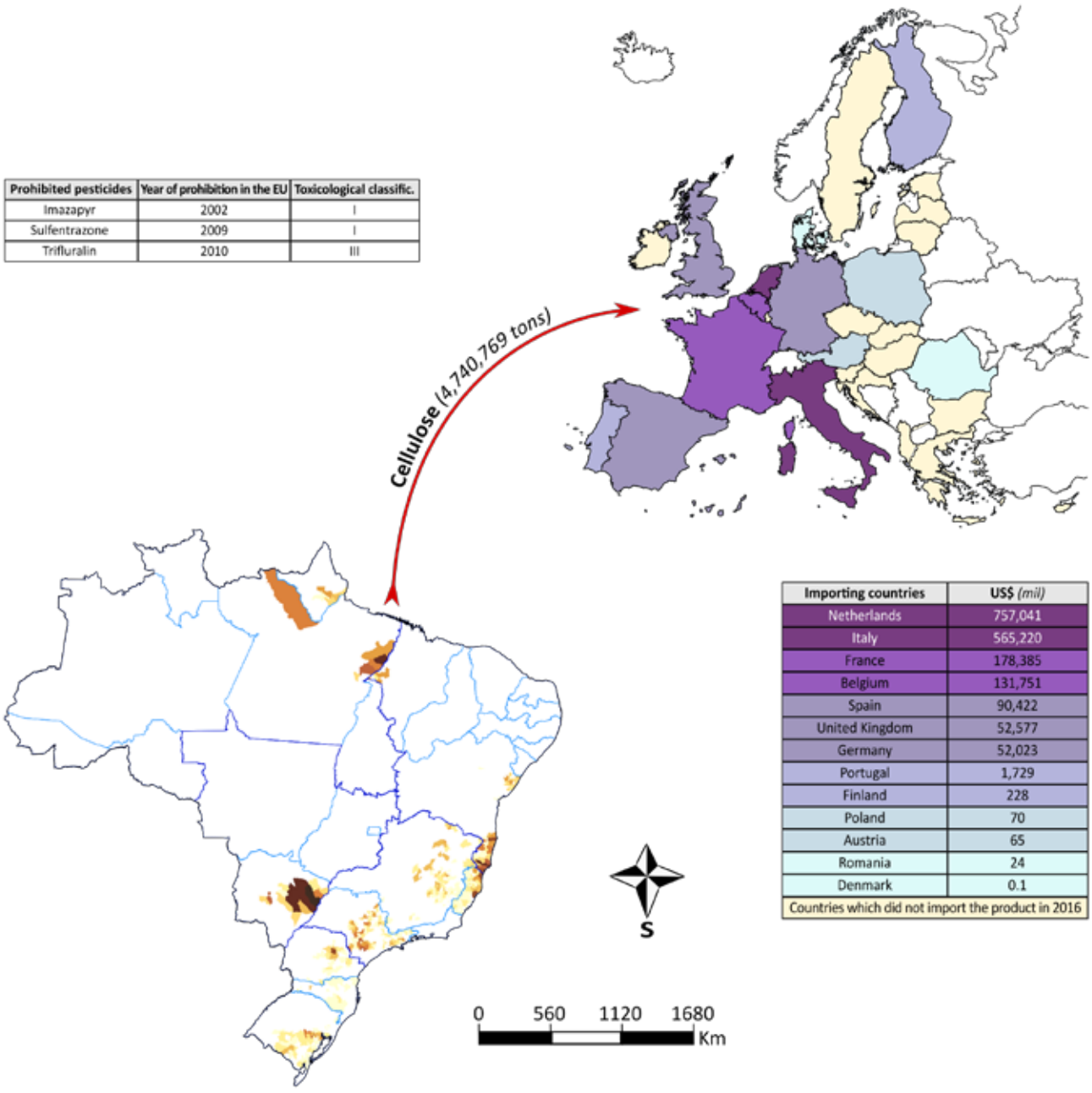
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF CELLULOSE**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Imazapyr	2002	I
Sulfentrazone	2009	I
Trifluralin	2010	III



Importing countries	US$ *(mil)*
Netherlands	757,041
Italy	565,220
France	178,385
Belgium	131,751
Spain	90,422
United Kingdom	52,577
Germany	52,023
Portugal	1,729
Finland	228
Poland	70
Austria	65
Romania	24
Denmark	0.1
Countries which did not import the product in 2016	

Municipalities producing eucalyptus in 2015 *(in m³)*

- 2,192,771
- 1,344,527 - 2,192,770
- 945,330 - 1,344,526
- 743,204 - 945,329
- 505,318 - 743,203
- 337,562 - 505,317
- 213,386 - 337,561
- 118,293 - 213,385
- 44,362 - 118,292
- 66 - 44,361

- Out of the 23 pesticides authorized for the cultivation of Brazilian eucalyptus, 3 are prohibited in the European Union.

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Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

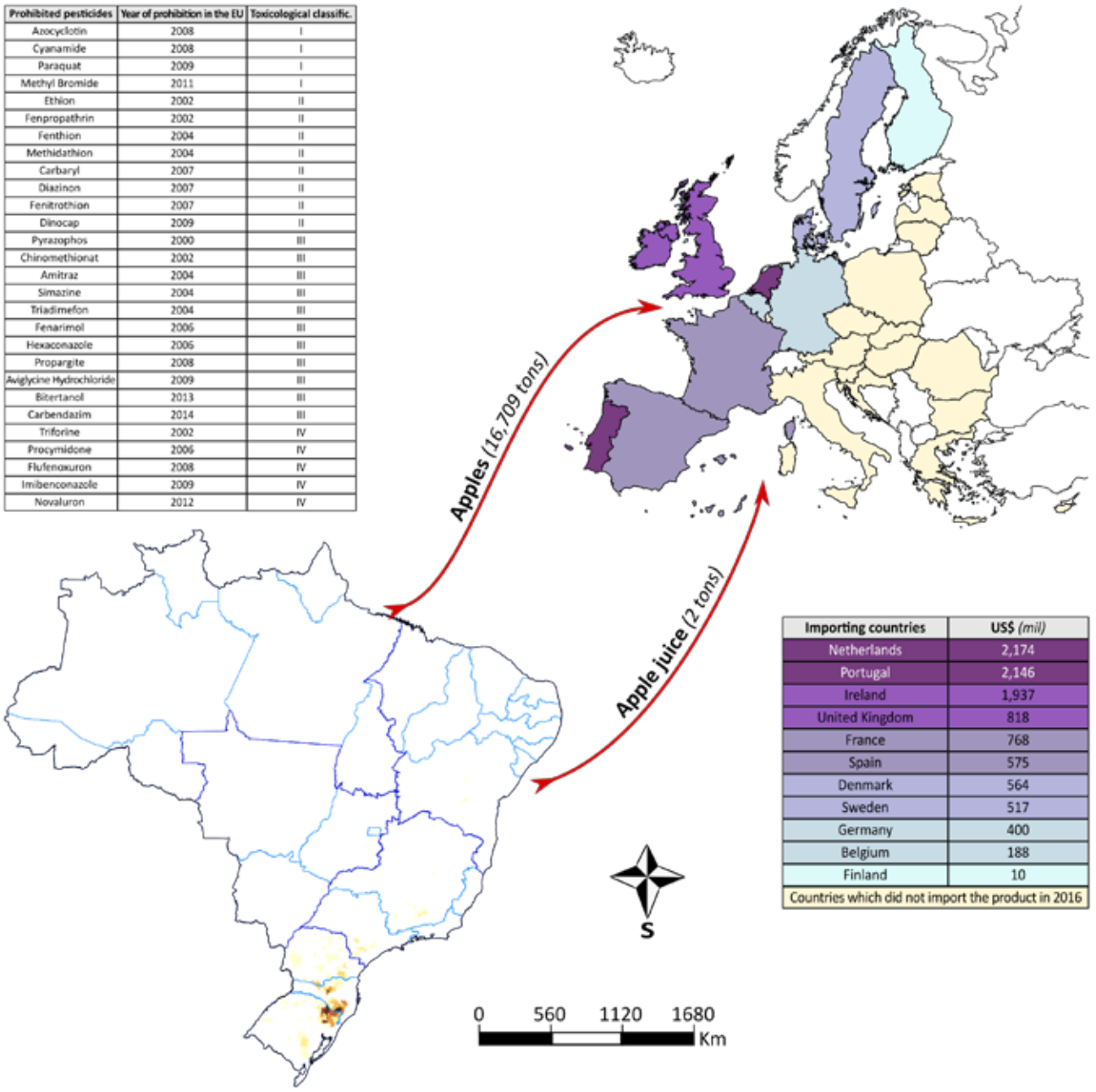
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF APPLE**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Azocyclotin	2008	I
Cyanamide	2008	I
Paraquat	2009	I
Methyl Bromide	2011	I
Ethion	2002	II
Fenpropathrin	2002	II
Fenthion	2004	II
Methidathion	2004	II
Carbaryl	2007	II
Diazinon	2007	II
Fenitrothion	2007	II
Dinocap	2009	II
Pyrazophos	2000	III
Chinomethionat	2002	III
Amitraz	2004	III
Simazine	2004	III
Triadimefon	2004	III
Fenarimol	2006	III
Hexaconazole	2006	III
Propargite	2008	III
Aviglycine Hydrochloride	2009	III
Bitertanol	2013	III
Carbendazim	2014	III
Triforine	2002	IV
Procymidone	2006	IV
Flufenoxuron	2008	IV
Imibenconazole	2009	IV
Novaluron	2012	IV



Importing countries	US$ *(mil)*
Netherlands	2,174
Portugal	2,146
Ireland	1,937
United Kingdom	818
France	768
Spain	575
Denmark	564
Sweden	517
Germany	400
Belgium	188
Finland	10
Countries which did not import the product in 2016	

Municipalities producing apple in 2015
(in tons)

- 279,720
- 216,640 - 279,719
- 86,880 - 216,639
- 80,500 - 86,879
- 30,000 - 80,499
- 19,600 - 29,999
- 12,950 - 19,599
- 6,600 - 12,949
- 1,120 - 6,599
- 1 - 1,119

- Out of the 96 pesticides authorized for the cultivation of Brazilian apple, 28 are prohibited in the European Union.

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Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
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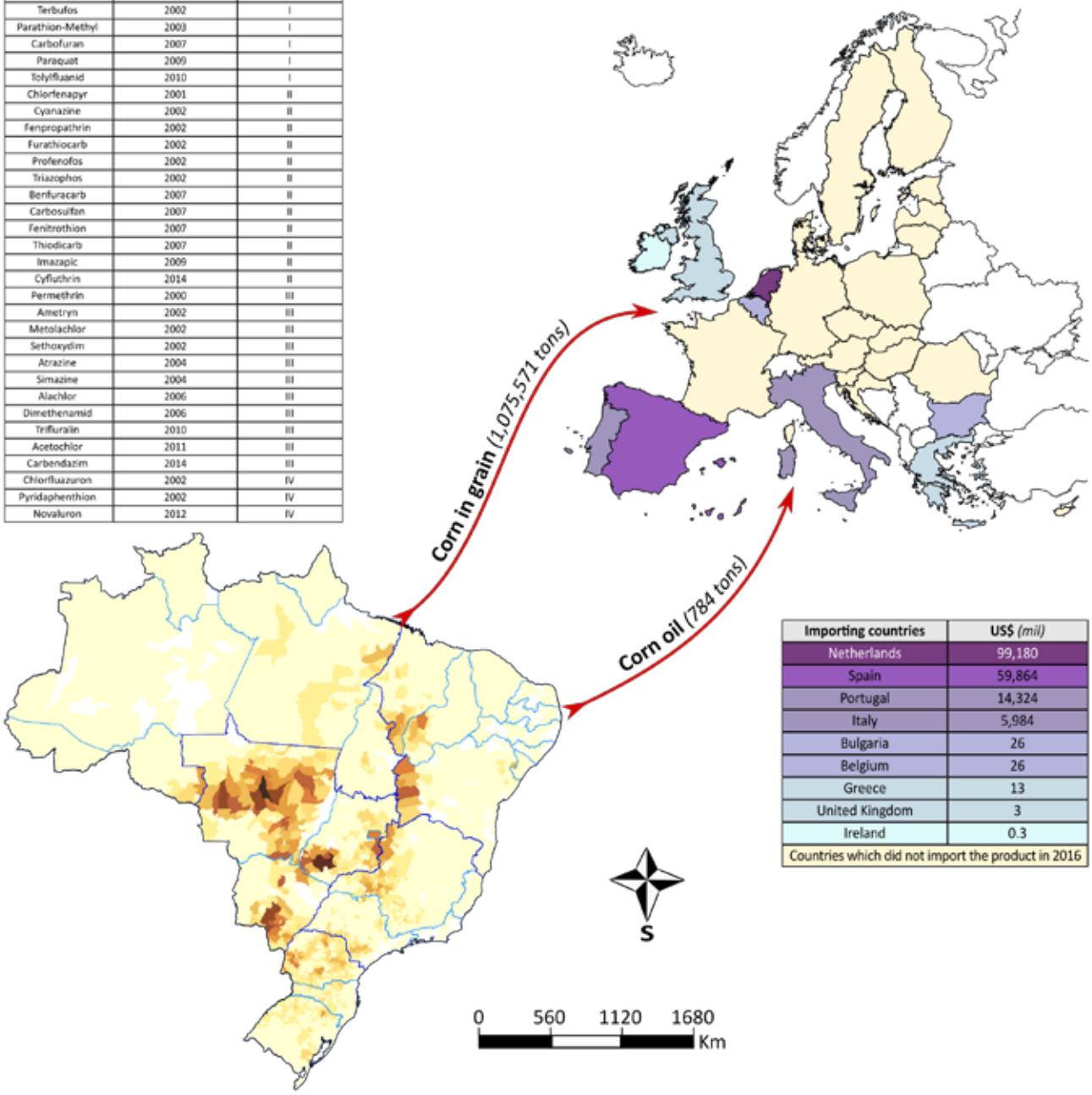
BRAZIL and EUROPEAN UNION **EXPORTATION OF MAIZE**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Imazapyr	2002	I
Terbufos	2002	I
Parathion-Methyl	2003	I
Carbofuran	2007	I
Paraquat	2009	I
Tolylfluanid	2010	I
Chlorfenapyr	2001	II
Cyanazine	2002	II
Fenpropathrin	2002	II
Furathiocarb	2002	II
Profenofos	2002	II
Triazophos	2002	II
Benfuracarb	2007	II
Carbosulfan	2007	II
Fenitrothion	2007	II
Thiodicarb	2007	II
Imazapic	2009	II
Cyfluthrin	2014	II
Permethrin	2000	III
Ametryn	2002	III
Metolachlor	2002	III
Sethoxydim	2002	III
Atrazine	2004	III
Simazine	2004	III
Alachlor	2006	III
Dimethenamid	2006	III
Trifluralin	2010	III
Acetochlor	2011	III
Carbendazim	2014	III
Chlorfluazuron	2002	IV
Pyridaphenthion	2002	IV
Novaluron	2012	IV



Importing countries	US$ *(mil)*
Netherlands	99,180
Spain	59,864
Portugal	14,324
Italy	5,984
Bulgaria	26
Belgium	26
Greece	13
United Kingdom	3
Ireland	0.3
Countries which did not import the product in 2016	

Municipalities producing maize in 2015
(in tons)

- 2,619,690
- 1,512,900 - 2,619,689
- 866,025 - 1,512,899
- 564,000 - 866,024
- 357,000 - 563,999
- 216,000 - 356,999
- 115,200 - 215,999
- 53,298 - 115,199
- 15,660 - 53,297
- 1 - 15,659

- Out of the 120 pesticides authorized for the cultivation of Brazilian maize, 32 are prohibited in the European Union.

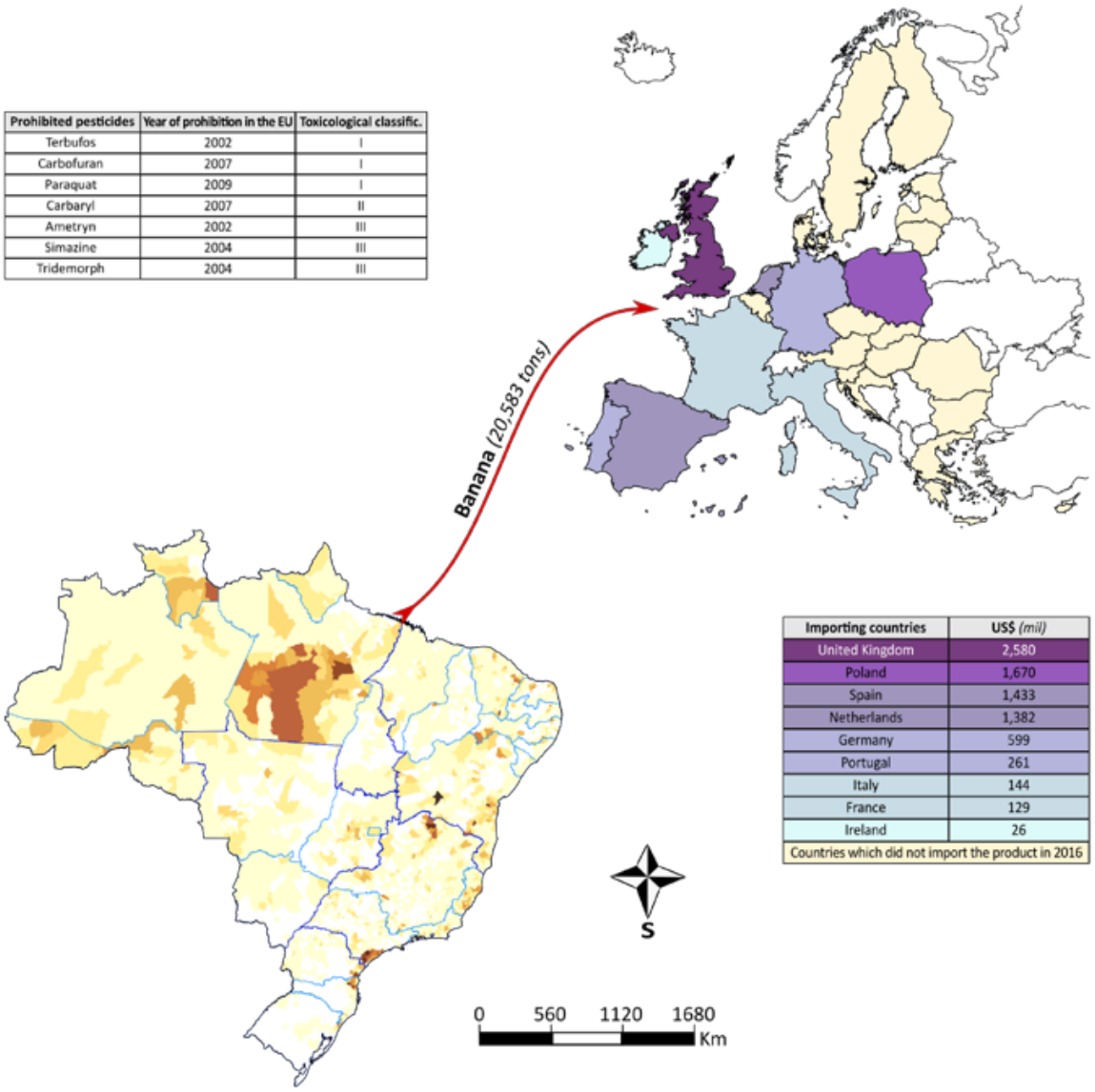
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF BANANA**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Terbufos	2002	I
Carbofuran	2007	I
Paraquat	2009	I
Carbaryl	2007	II
Ametryn	2002	III
Simazine	2004	III
Tridemorph	2004	III



Importing countries	US$ *(mil)*
United Kingdom	2,580
Poland	1,670
Spain	1,433
Netherlands	1,382
Germany	599
Portugal	261
Italy	144
France	129
Ireland	26
Countries which did not import the product in 2016	

Municipalities producing banana in 2015
(in tons)

- 152,014 - 171,000
- 112,120 - 152,013
- 60,986 - 112,119
- 41,160 - 60,985
- 28,800 - 41,159
- 19,040 - 28,799
- 11,200 - 19,039
- 5,220 - 11,199
- 1,540 - 5,219
- 1 - 1,539

- Out of the 44 pesticides authorized for the cultivation of Brazilian banana, 7 are prohibited in the European Union.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

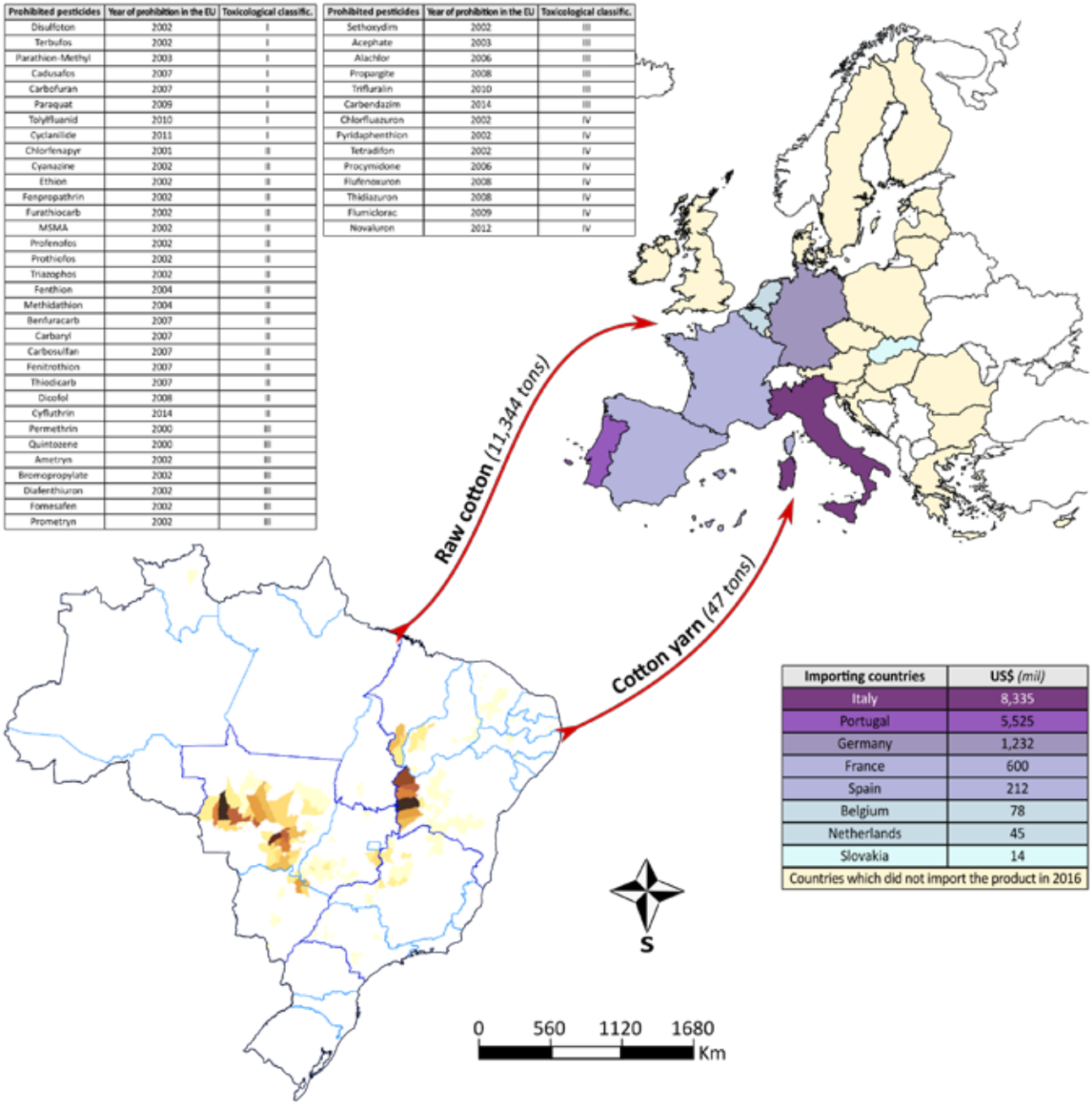
BRAZIL and EUROPEAN UNION **EXPORTATION OF COTTON**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Disulfoton	2002	I
Terbufos	2002	I
Parathion-Methyl	2003	I
Cadusafos	2007	I
Carbofuran	2007	I
Paraquat	2009	I
Tolylfluanid	2010	I
Cyclanilide	2011	I
Chlorfenapyr	2001	II
Cyanazine	2002	II
Ethion	2002	II
Fenpropathrin	2002	II
Furathiocarb	2002	II
MSMA	2002	II
Profenofos	2002	II
Prothiofos	2002	II
Triazophos	2002	II
Fenthion	2004	II
Methidathion	2004	II
Benfuracarb	2007	II
Carbaryl	2007	II
Carbosulfan	2007	II
Fenitrothion	2007	II
Thiodicarb	2007	II
Dicofol	2008	II
Cyfluthrin	2014	II
Permethrin	2000	III
Quintozene	2000	III
Ametryn	2002	III
Bromopropylate	2002	III
Diafenthiuron	2002	III
Fomesafen	2002	III
Prometryn	2002	III

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Sethoxydim	2002	III
Acephate	2003	III
Alachlor	2006	III
Propargite	2008	III
Trifluralin	2010	III
Carbendazim	2014	III
Chlorfluazuron	2002	IV
Pyridaphenthion	2002	IV
Tetradifon	2002	IV
Procymidone	2006	IV
Flufenoxuron	2008	IV
Thidiazuron	2008	IV
Flumiclorac	2009	IV
Novaluron	2012	IV



Importing countries	US$ *(mil)*
Italy	8,335
Portugal	5,525
Germany	1,232
France	600
Spain	212
Belgium	78
Netherlands	45
Slovakia	14
Countries which did not import the product in 2016	

Municipalities producing cotton in 2015
(in tons)

- 440,800 - 477,268
- 336,996 - 440,799
- 190,350 - 336,995
- 131,365 - 190,349
- 105,347 - 131,364
- 68,320 - 105,346
- 37,399 - 68,319
- 19,650 - 37,398
- 6,150 - 19,649
- 1 - 6,149

- Out of the 160 pesticides authorized for the cultivation of Brazilian cotton, 47 are prohibited in the European Union.

Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**

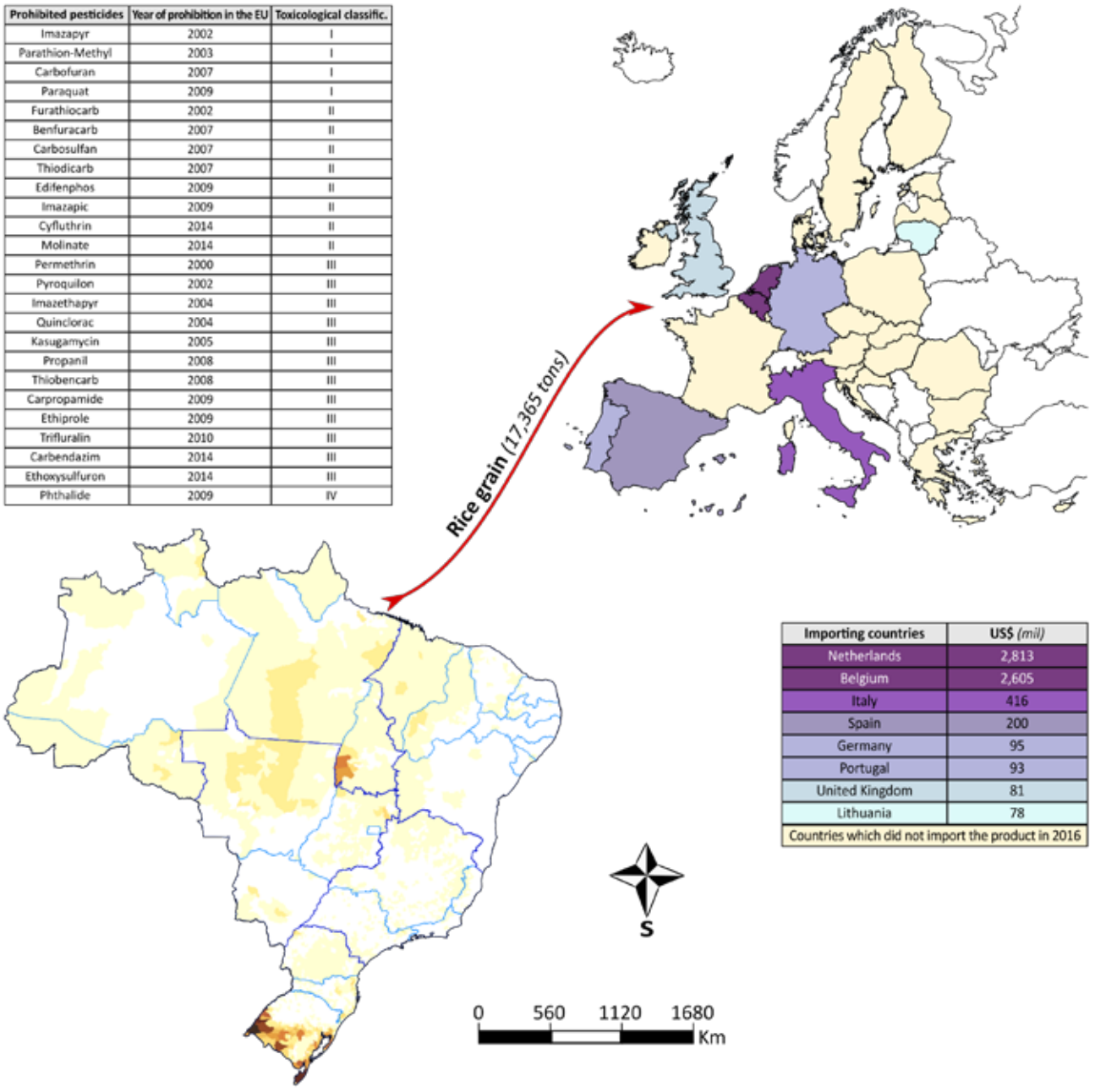
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF RICE**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Imazapyr	2002	I
Parathion-Methyl	2003	I
Carbofuran	2007	I
Paraquat	2009	I
Furathiocarb	2002	II
Benfuracarb	2007	II
Carbosulfan	2007	II
Thiodicarb	2007	II
Edifenphos	2009	II
Imazapic	2009	II
Cyfluthrin	2014	II
Molinate	2014	II
Permethrin	2000	III
Pyroquilon	2002	III
Imazethapyr	2004	III
Quinclorac	2004	III
Kasugamycin	2005	III
Propanil	2008	III
Thiobencarb	2008	III
Carpropamide	2009	III
Ethiprole	2009	III
Trifluralin	2010	III
Carbendazim	2014	III
Ethoxysulfuron	2014	III
Phthalide	2009	IV



Importing countries	US$ *(mil)*
Netherlands	2,813
Belgium	2,605
Italy	416
Spain	200
Germany	95
Portugal	93
United Kingdom	81
Lithuania	78
Countries which did not import the product in 2016	

Municipalities producing rice in 2015
(in tons)

- 751,684
- 582,633 - 751,683
- 419,521 - 582,632
- 337,840 - 419,520
- 225,150 - 337,839
- 166,045 - 225,149
- 90,992 - 166,044
- 45,000 - 90,991
- 10,800 - 44,999
- 1 - 10,799

- Out of the 100 pesticides authorized for the cultivation of Brazilian rice, 25 are prohibited in the European Union.

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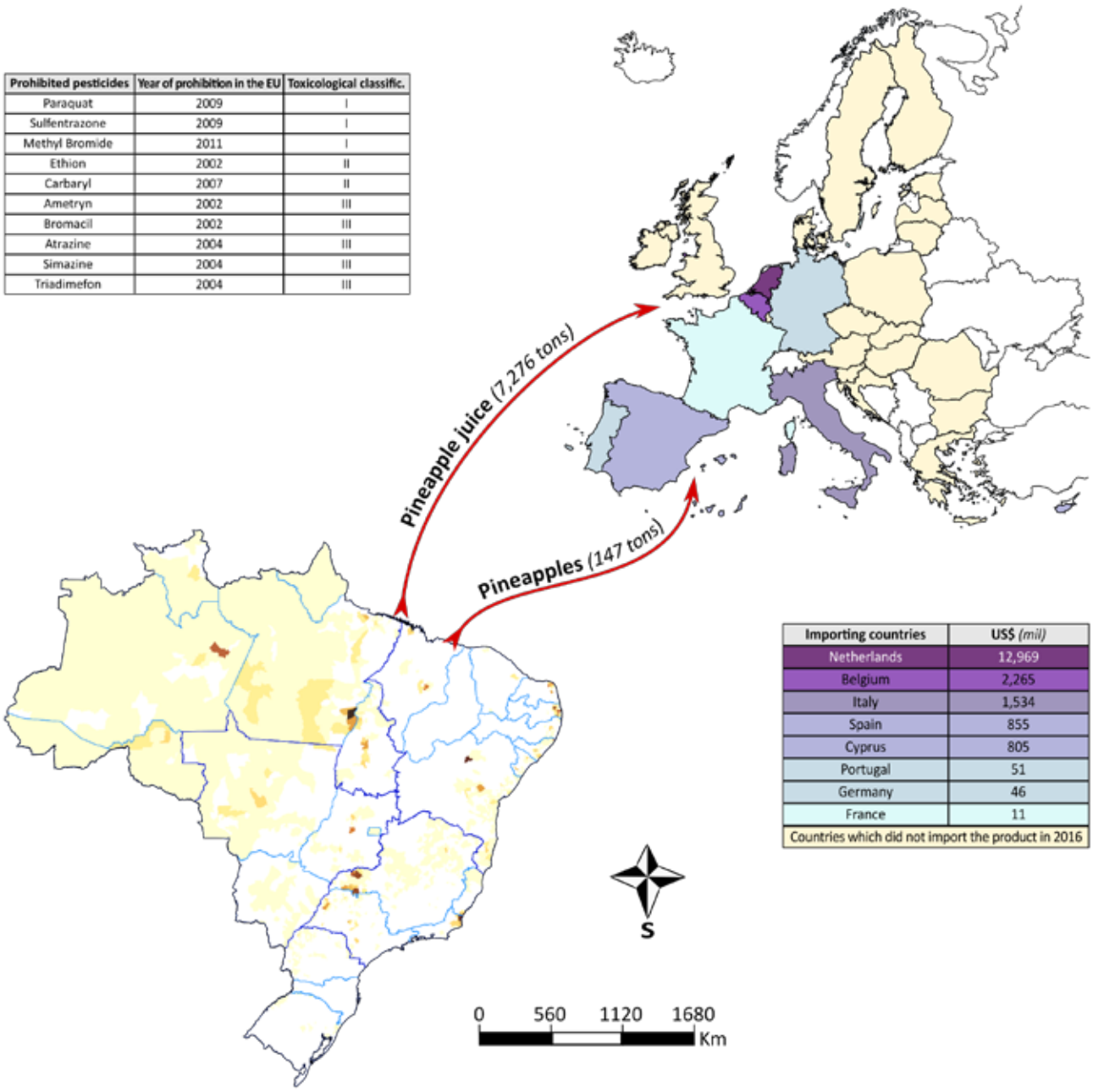
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF PINEAPPLE**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Paraquat	2009	I
Sulfentrazone	2009	I
Methyl Bromide	2011	I
Ethion	2002	II
Carbaryl	2007	II
Ametryn	2002	III
Bromacil	2002	III
Atrazine	2004	III
Simazine	2004	III
Triadimefon	2004	III



Importing countries	US$ *(mil)*
Netherlands	12,969
Belgium	2,265
Italy	1,534
Spain	855
Cyprus	805
Portugal	51
Germany	46
France	11
Countries which did not import the product in 2016	

Municipalities producing pineapple in 2015 *(in tons)*

- 290,334
- 72,000 - 290,333
- 60,000 - 71,999
- 51,000 - 59,999
- 30,550 - 50,999
- 15,840 - 30,549
- 8,700 - 15,839
- 4,050 - 8,699
- 1,394 - 4,049
- 2 - 1,393

- Out of the 24 pesticides authorized for the cultivation of Brazilian pineapple, 10 are prohibited in the European Union.

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Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

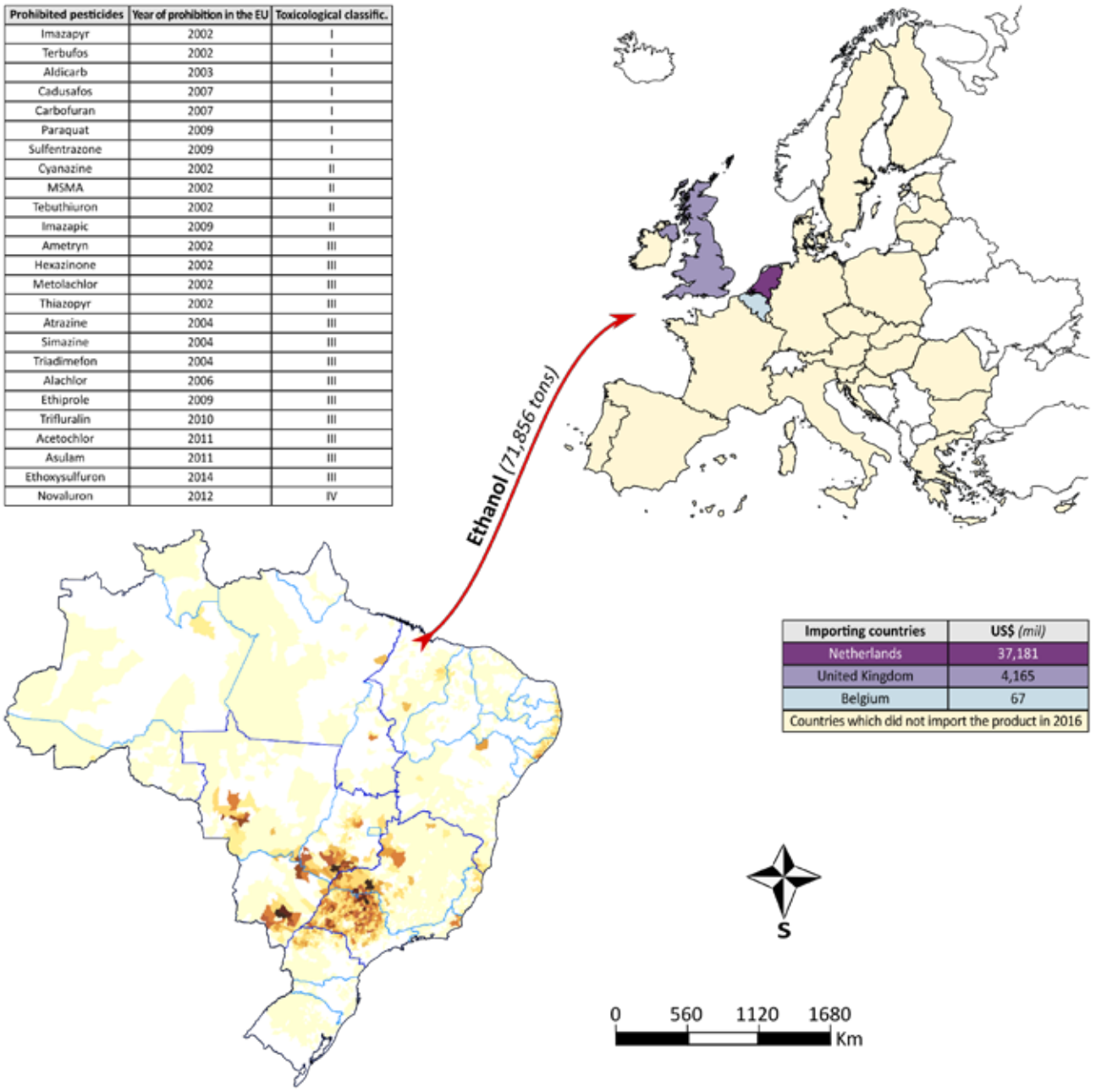
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF ETHANOL**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Imazapyr	2002	I
Terbufos	2002	I
Aldicarb	2003	I
Cadusafos	2007	I
Carbofuran	2007	I
Paraquat	2009	I
Sulfentrazone	2009	I
Cyanazine	2002	II
MSMA	2002	II
Tebuthiuron	2002	II
Imazapic	2009	II
Ametryn	2002	III
Hexazinone	2002	III
Metolachlor	2002	III
Thiazopyr	2002	III
Atrazine	2004	III
Simazine	2004	III
Triadimefon	2004	III
Alachlor	2006	III
Ethiprole	2009	III
Trifluralin	2010	III
Acetochlor	2011	III
Asulam	2011	III
Ethoxysulfuron	2014	III
Novaluron	2012	IV



Importing countries	US$ *(mil)*
Netherlands	37,181
United Kingdom	4,165
Belgium	67
Countries which did not import the product in 2016	

Municipalities producing sugarcane in 2015 *(in tons)*

- 6,266,200 - 7,600,000
- 4,604,000 - 6,266,199
- 3,226,500 - 4,603,999
- 2,480,000 - 3,226,499
- 1,802,000 - 2,479,999
- 1,260,000 - 1,801,999
- 821,590 - 1,259,999
- 435,609 - 821,589
- 142,460 - 435,608
- 7 - 142,459

- Out of the 85 pesticides authorized for the cultivation of Brazilian sugarcane, 25 are prohibited in the European Union.

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Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

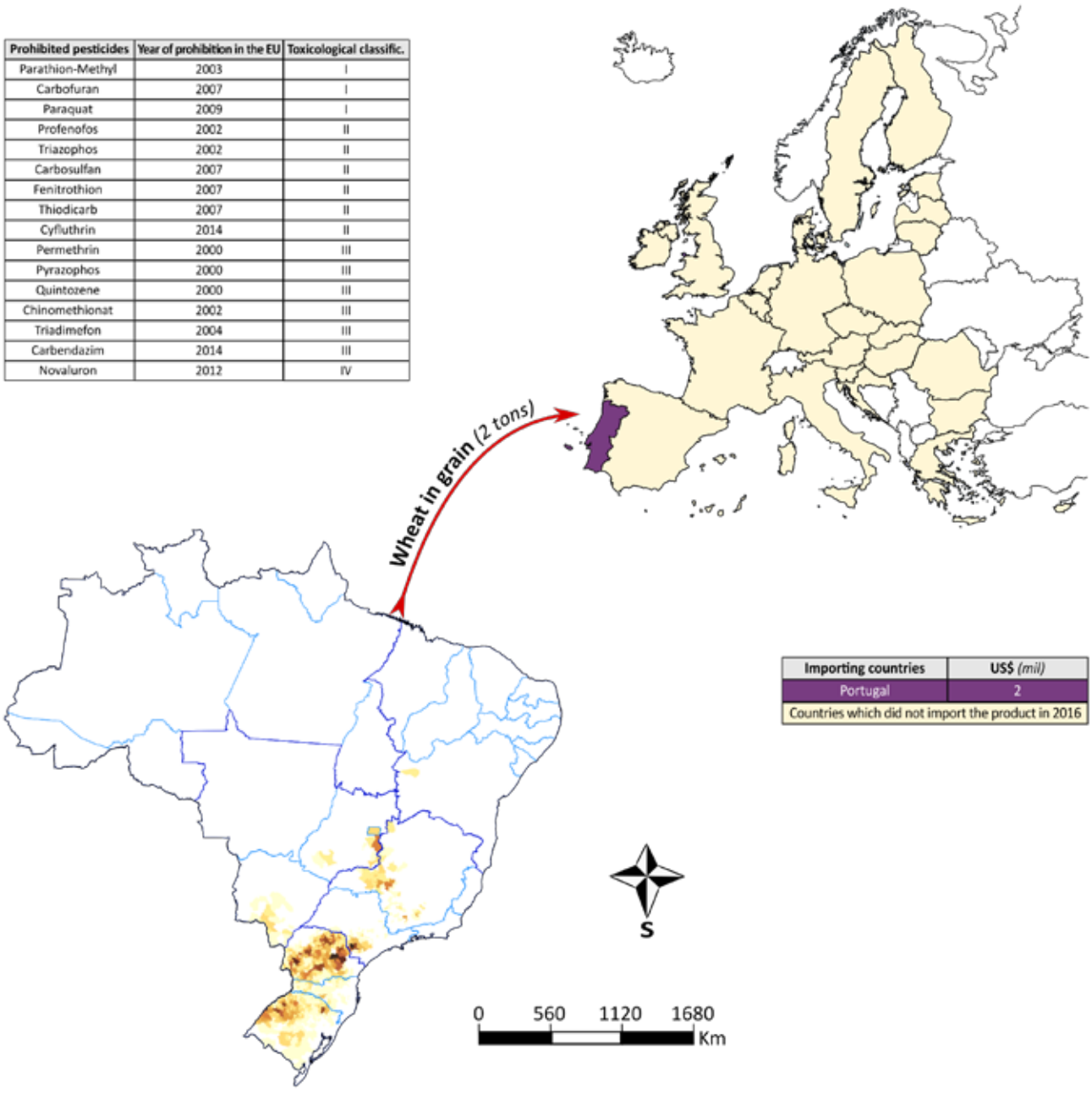
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **EXPORTATION OF WHEAT**

AGROTOXINS AUTHORIZED IN BRAZIL AND PROHIBITED IN THE EU

Brazilian Exportations (2016)

Prohibited pesticides	Year of prohibition in the EU	Toxicological classific.
Parathion-Methyl	2003	I
Carbofuran	2007	I
Paraquat	2009	I
Profenofos	2002	II
Triazophos	2002	II
Carbosulfan	2007	II
Fenitrothion	2007	II
Thiodicarb	2007	II
Cyfluthrin	2014	II
Permethrin	2000	III
Pyrazophos	2000	III
Quintozene	2000	III
Chinomethionat	2002	III
Triadimefon	2004	III
Carbendazim	2014	III
Novaluron	2012	IV



Importing countries	US$ *(mil)*
Portugal	2
Countries which did not import the product in 2016	

Municipalities producing wheat in 2015
(in tons)

- 95,000 - 114,000
- 71,815 - 94,999
- 52,500 - 71,814
- 34,348 - 52,499
- 25,500 - 34,347
- 16,800 - 25,499
- 10,400 - 16,799
- 5,590 - 10,399
- 2,100 - 5,589
- 3 - 2,099

- Out of the 101 pesticides authorized for the cultivation of Brazilian wheat, 16 are prohibited in the European Union.

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BRAZIL **AREAS OCCUPIED X COUNTRIES OF THE EUROPEAN UNION**

BRAZIL **AREA OCCUPIED WITH EUCALYPTUS**

COMPARED WITH THE AREA OF COUNTRIES OF THE EUROPEAN UNION

(hectares)

Plantation area for eucalyptus in Brazil:

7,444,731 ha

=

2.4x Belgium

Land area of Belgium:

3,053,000 ha

0.8x Portugal

Land area of Portugal:

9,209,000 ha

0.9x Scotland

Land area of Scotland:

7,877,200 ha

- The representation of the European union countries are proportional among themselves;

- The representation of Brazil relation to the countries of the European Union was 6.8 times reduced in order to enable its illustration in parallel to the others.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

BRAZIL **AREA OCCUPIED WITH SUGARCANE**

COMPARED WITH THE AREA OF COUNTRIES OF THE EUROPEAN UNION

(hectares)

3.5x Belgium

Land area of Belgium:

3,053,000 ha

Plantation area for sugarcane in Brazil:

10,536,274 ha

=

1.1x Portugal

Land area of Portugal:

9,209,000 ha

1.3x Scotland

Land area of Scotland:

7,877,200 ha

- The representation of the European union countries are proportional among themselves;

- The representation of Brazil relation to the countries of the European Union was 6.8 times reduced in order to enable its illustration in parallel to the others.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: IBGE

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Mapping: Eduardo Penha

Support: CAPES / FAPESP

BRAZIL **AREA OCCUPIED WITH SOYBEAN**

COMPARED WITH THE AREA OF COUNTRIES OF THE EUROPEAN UNION

(hectares)

Plantation area for soybean in Brazil:

33,245,190 ha

=

10.9x Belgium

Land area of Belgium:

3,053,000 ha

3.6x Portugal

Land area of Portugal:

9,209,000 ha

4.2x Scotland

Land area of Scotland:

7,877,200 ha

- The representation of the European union countries are proportional among themselves;

- The representation of Brazil relation to the countries of the European Union was 6.8 times reduced in order to enable its illustration in parallel to the others.

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Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: IBGE
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

BRAZIL AND EUROPEAN UNION

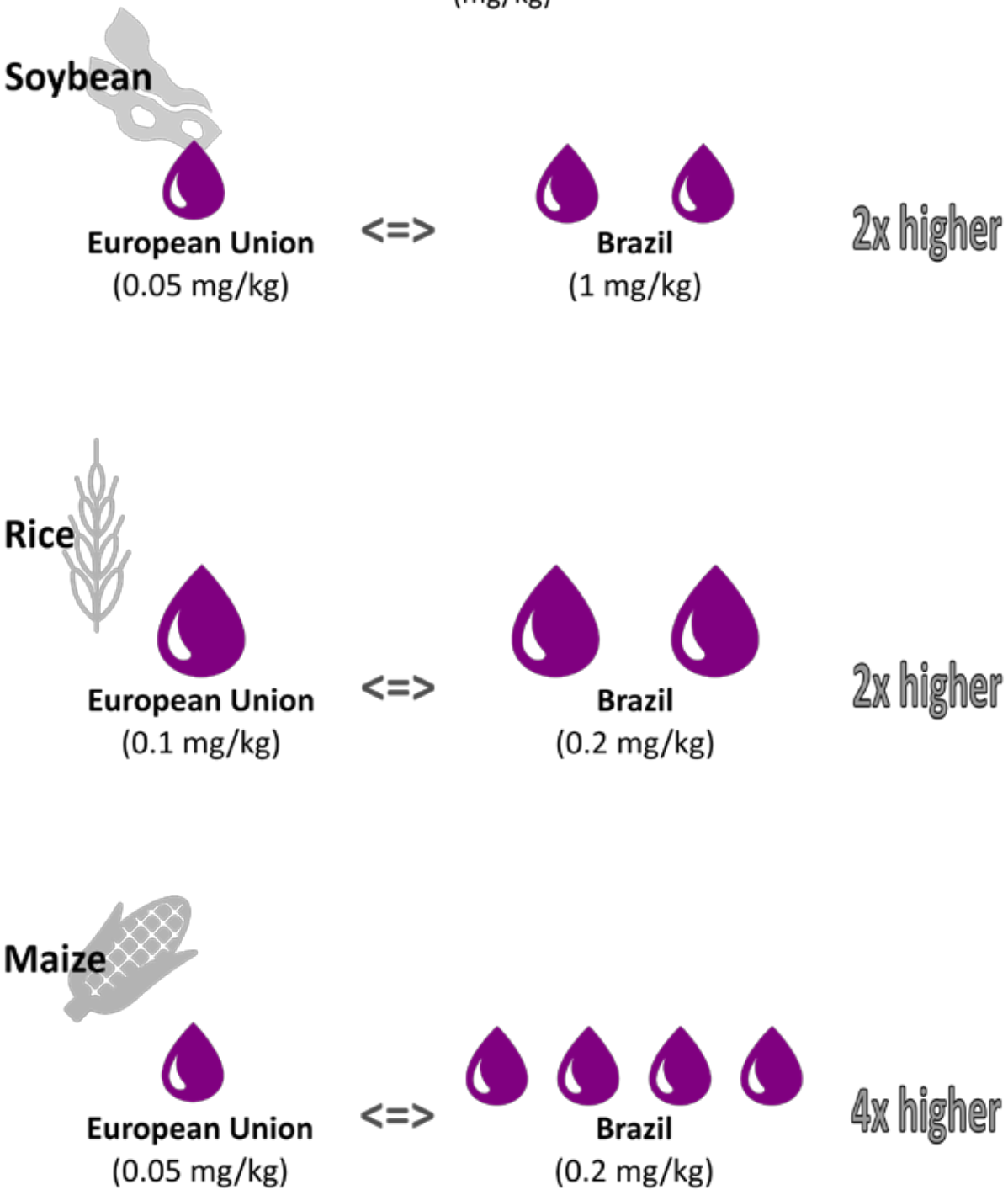
COMPARISON BETWEEN THE MAXIMUM RESIDUE LIMIT

FOODS

BRAZIL and EUROPEAN UNION **2.4-D (herbicide)**

MAXIMUM RESIDUE LIMIT - MRL

(mg/kg)



- 2.4-D is the second best-selling pesticide in Brazil. In 2014, sales reached 36,514 tons.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: Anvisa (2017); European Commission (2017)

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **ATRAZINE (herbicide)**

MAXIMUM RESIDUE LIMIT - MRL

(mg/kg)

Sugarcane

European Union (0.05 mg/kg) <=> **Brazil** (0.25 mg/kg) 5x higher

Maize

European Union (0.05 mg/kg) <=> **Brazil** (0.25 mg/kg) 5x higher

Sorghum

European Union (0.05 mg/kg) <=> **Brazil** (0.25 mg/kg) 5x higher

- Atrazine is the seventh best-selling pesticide in Brazil and has been prohibited in the European Union since 2004. In 2014, sales reached 13,911 tons.

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Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **ACEPHATE (insecticide / acaricide)**

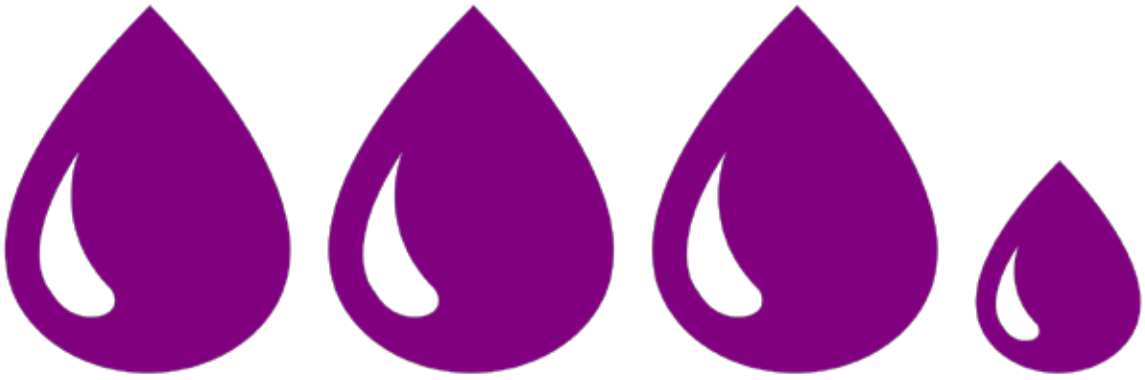
MAXIMUM RESIDUE LIMIT - MRL

(mg/kg)

Soybean

European Union

(0.3 mg/kg)



Brazil

(1 mg/kg)

3.3x higher

- Acephate is the third best-selling pesticide in Brazil and has been prohibited in the European Union since 2003. In 2014, sales reached 26,191 tons.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: Anvisa (2017); European Commission (2017)

Mapping software: Philcarto I Mapping base: IBGE

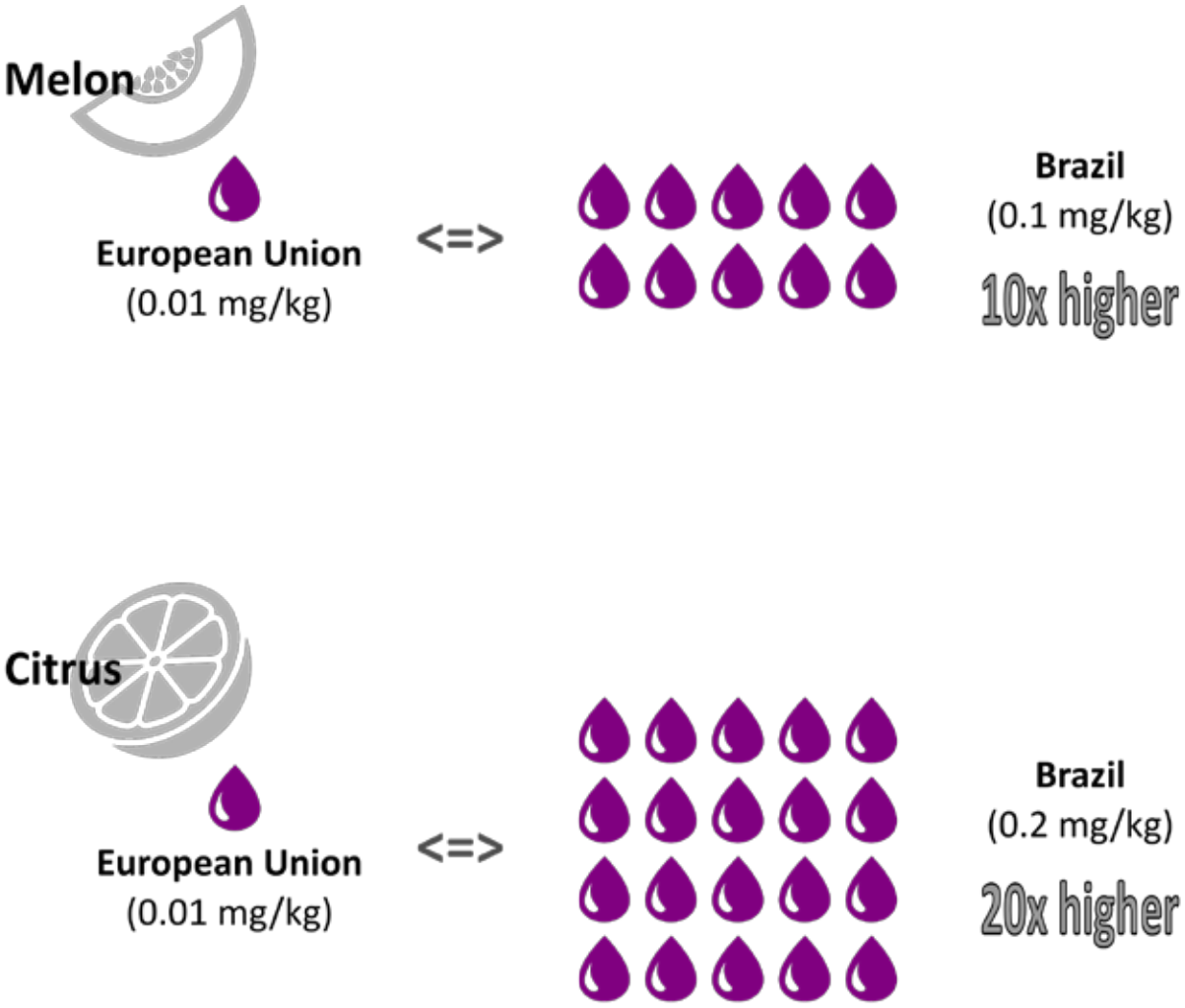
Mapping: Eduardo Penha

Support: CAPES / FAPESP

BRAZIL and EUROPEAN UNION **ACEPHATE (insecticide / acaricide)**

MAXIMUM RESIDUE LIMIT - MRL

(mg/kg)



- Acephate is the third best-selling pesticide in Brazil and has been prohibited in the European Union since 2003. In 2014, sales reached 26,191 tons.

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Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

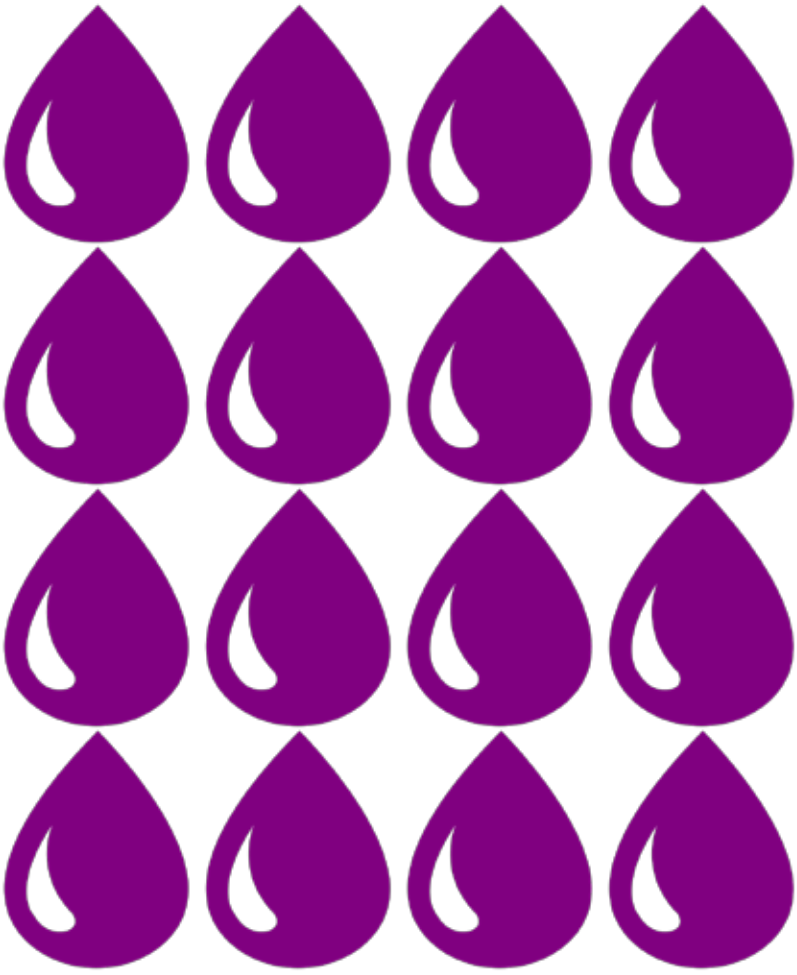
BRAZIL and EUROPEAN UNION **MALATHION (insecticide / acaricide)**

MAXIMUM RESIDUE LIMIT - MRL

(mg/kg)

Lettuce

European Union
(0.5 mg/kg)



Brazil
(8 mg/kg)

16x higher

- Malathion is the 16th best-selling pesticide in Brazil. In 2013, sales reached 4,987 tons.

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Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**

Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
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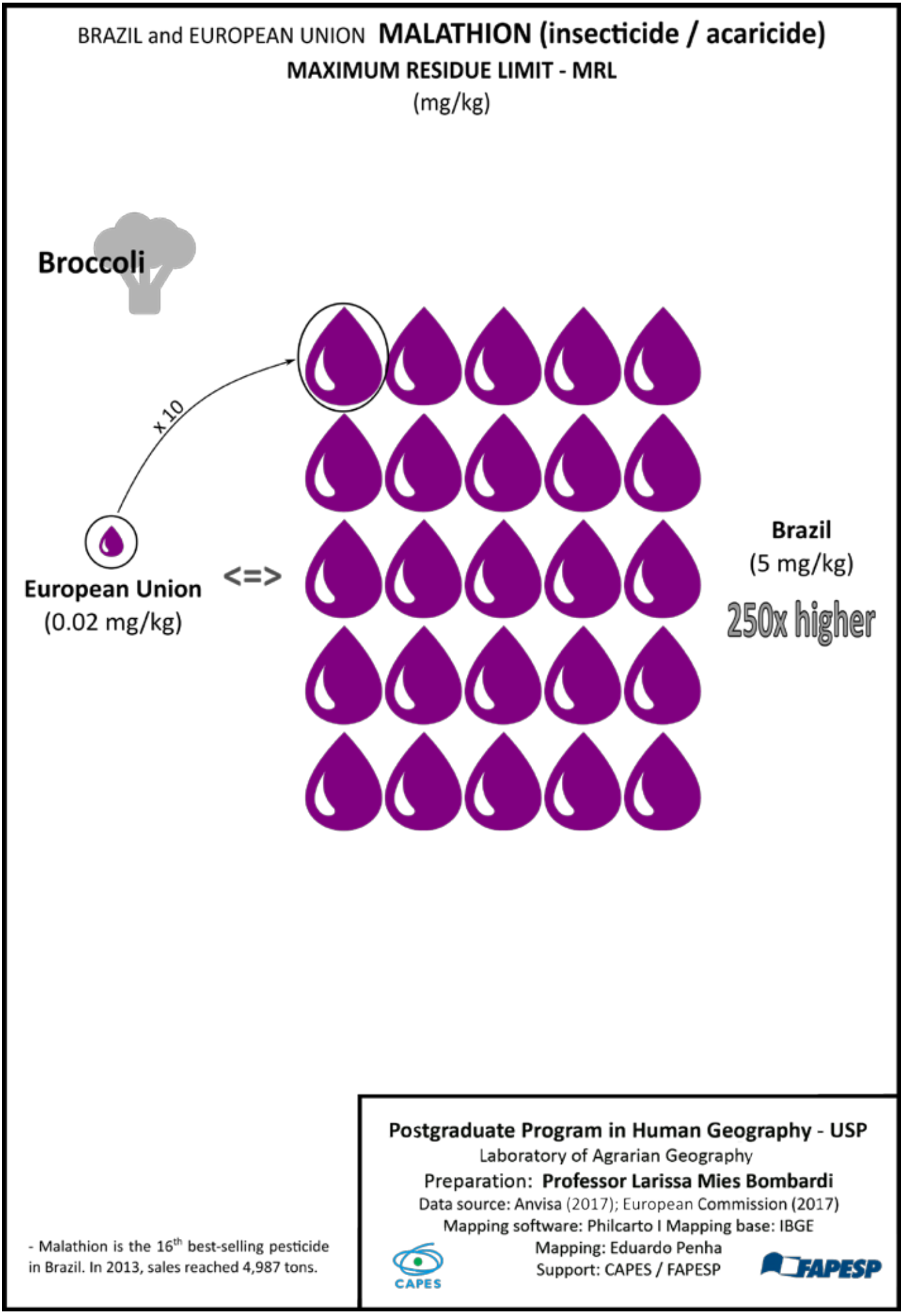
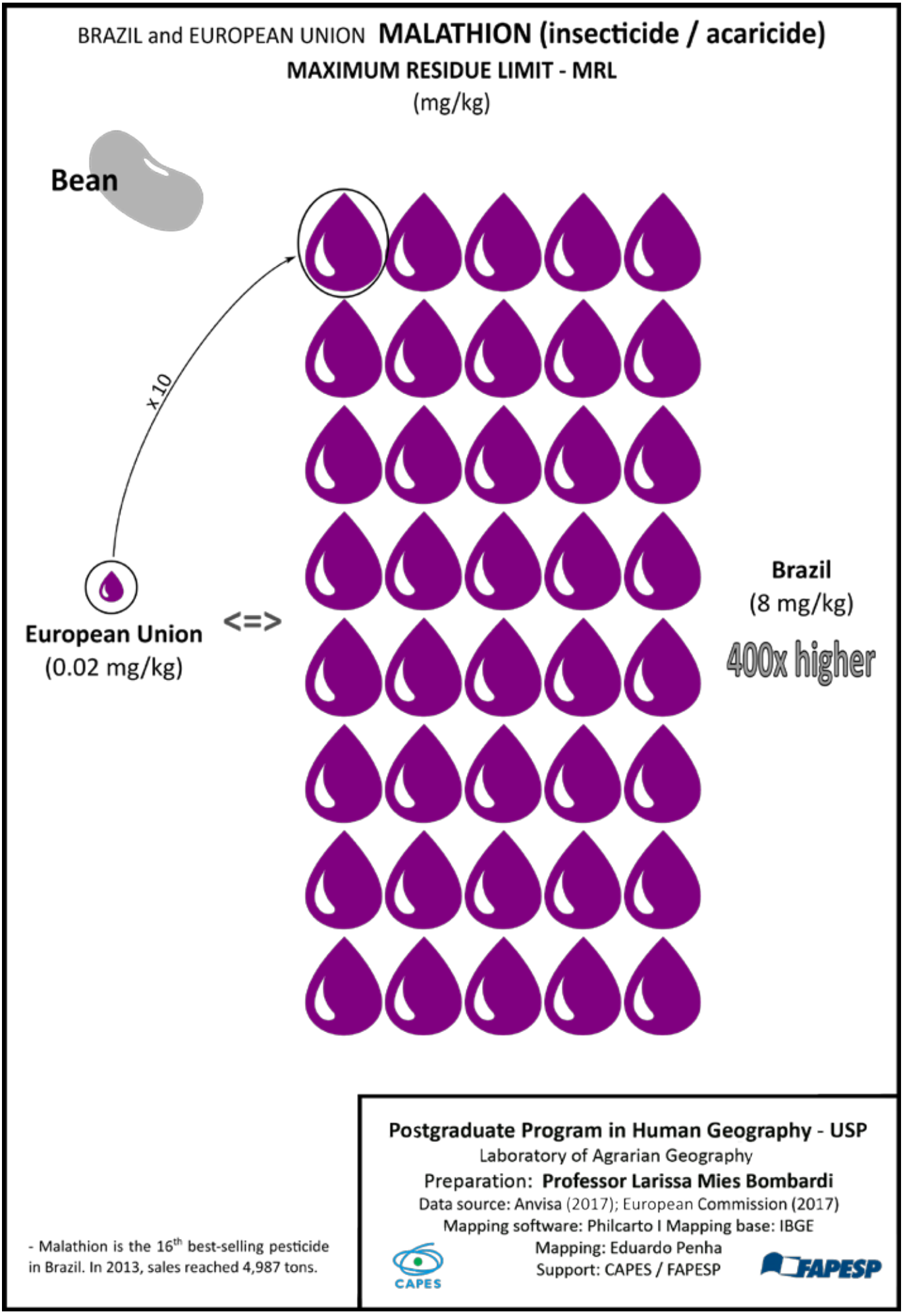

BRAZIL and EUROPEAN UNION MALATHION (insecticide / acaricide)
MAXIMUM RESIDUE LIMIT - MRL
(mg/kg)
Broccoli
x 10
European Union
(0.02 mg/kg)
<=>
Brazil
(5 mg/kg)
250x higher
- Malathion is the 16th best-selling pesticide in Brazil. In 2013, sales reached 4,987 tons.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP


BRAZIL and EUROPEAN UNION MALATHION (insecticide / acaricide)
MAXIMUM RESIDUE LIMIT - MRL
(mg/kg)
Bean
x 10
European Union
(0.02 mg/kg)
<=>
Brazil
(8 mg/kg)
400x higher
- Malathion is the 16th best-selling pesticide in Brazil. In 2013, sales reached 4,987 tons.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
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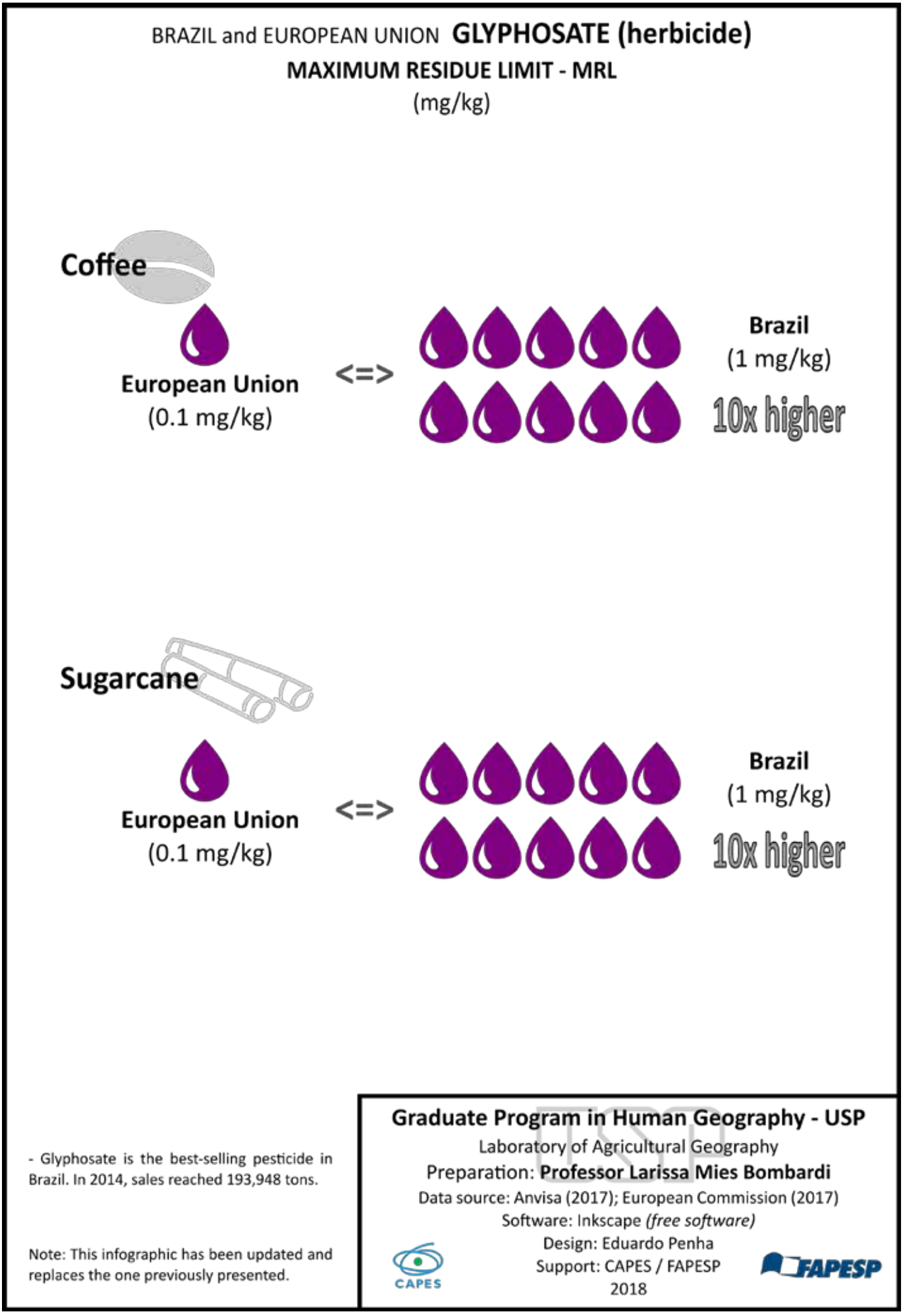
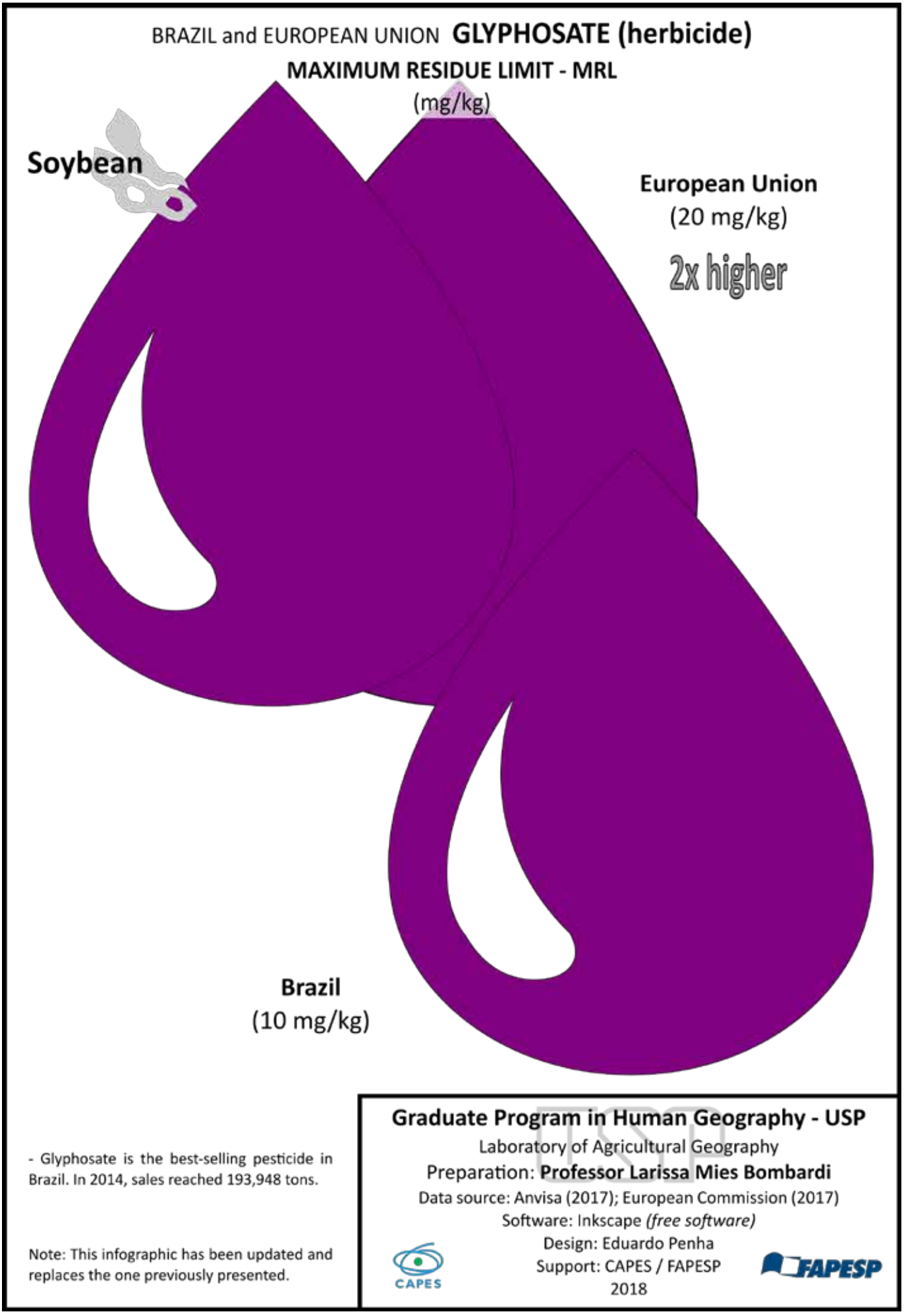

BRAZIL and EUROPEAN UNION GLYPHOSATE (herbicide)
MAXIMUM RESIDUE LIMIT - MRL
(mg/kg)
Coffee
European Union
(0.1 mg/kg)
<=>
Brazil
(1 mg/kg)
10x higher
Sugarcane
European Union
(0.1 mg/kg)
<=>
Brazil
(1 mg/kg)
10x higher
- Glyphosate is the best-selling pesticide in Brazil. In 2014, sales reached 193,948 tons.
Note: This infographic has been updated and replaces the one previously presented.
Graduate Program in Human Geography - USP
Laboratory of Agricultural Geography
Preparation: Professor Larissa Mies Bombardi
Data source: Anvisa (2017); European Commission (2017)
Software: Inkscape (free software)
Design: Eduardo Penha
Support: CAPES / FAPESP
2018
CAPES
FAPESP


BRAZIL and EUROPEAN UNION GLYPHOSATE (herbicide)
MAXIMUM RESIDUE LIMIT - MRL
(mg/kg)
Soybean
European Union
(20 mg/kg)
2x higher
Brazil
(10 mg/kg)
- Glyphosate is the best-selling pesticide in Brazil. In 2014, sales reached 193,948 tons.
Note: This infographic has been updated and replaces the one previously presented.
Graduate Program in Human Geography - USP
Laboratory of Agricultural Geography
Preparation: Professor Larissa Mies Bombardi
Data source: Anvisa (2017); European Commission (2017)
Software: Inkscape (free software)
Design: Eduardo Penha
Support: CAPES / FAPESP
2018
CAPES
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BRAZIL AND EUROPEAN UNION

COMPARISON BETWEEN THE MAXIMUM RESIDUE LIMIT

DRINKING WATER

BRAZIL and EUROPEAN UNION **DRINKING WATER**

MAXIMUM RESIDUE LIMIT - MRL

(µg/L)

Atrazine

(herbicide)

European Union
(0.1 µg/L)

<=>

Brazil
(2 µg/L)

20x higher

Acephate

(insecticide / acaricide)

European Union
(0.1 µg/L)

<=>

Brazil
(? µg/L)

no limit established

Malathion

(insecticide / acaricide)

European Union
(0.1 µg/L)

<=>

Brazil
(? µg/L)

no limit established

- **Acephate** and **Atrazine** are respectively the 3rd and 7th best-selling pesticides in Brazil and have been prohibited in the European Union since 2003 and 2004. In 2014, sales reached respectively 26,191 e 13,911 tons.

- **Malathion** is the 16th best-selling pesticide in Brazil. In 2013, sales reached 4,987 tons.

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Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
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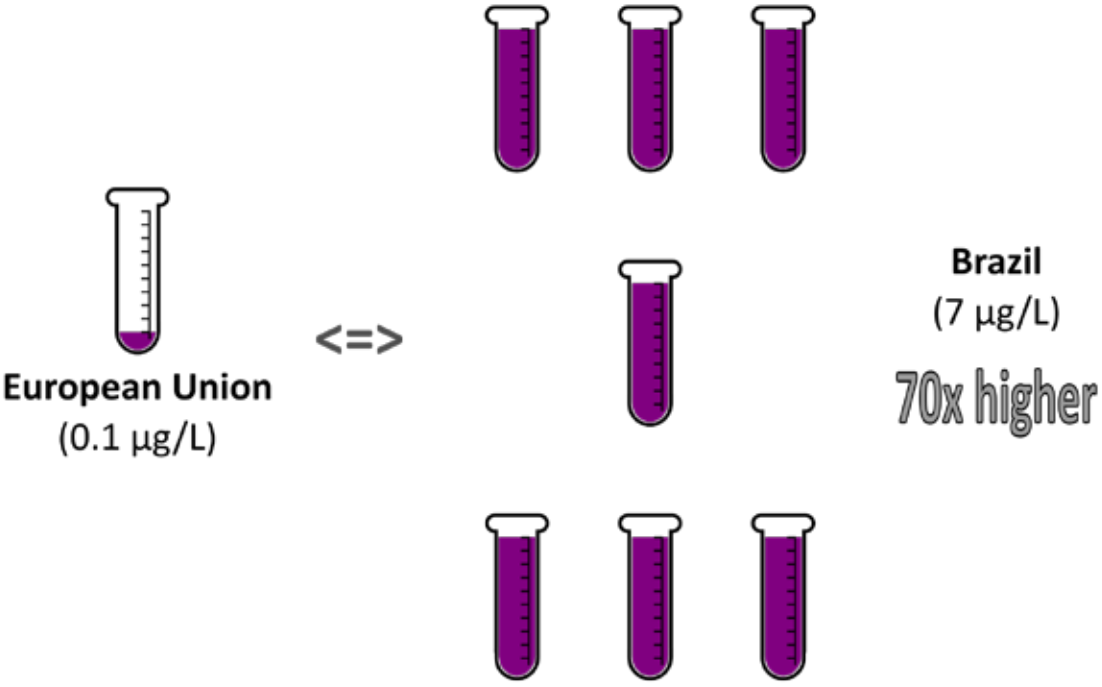
BRAZIL and EUROPEAN UNION **DRINKING WATER**

MAXIMUM RESIDUE LIMIT - MRL

(µg/L)

Carbofuran

(insecticide / acaricide)



- Carbofuran is the 26th best-selling pesticide in Brazil and has been prohibited in the European Union since 2007. In 2013, sales reached 1,740 tons.

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Preparation: **Professor Larissa Mies Bombardi**
Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP

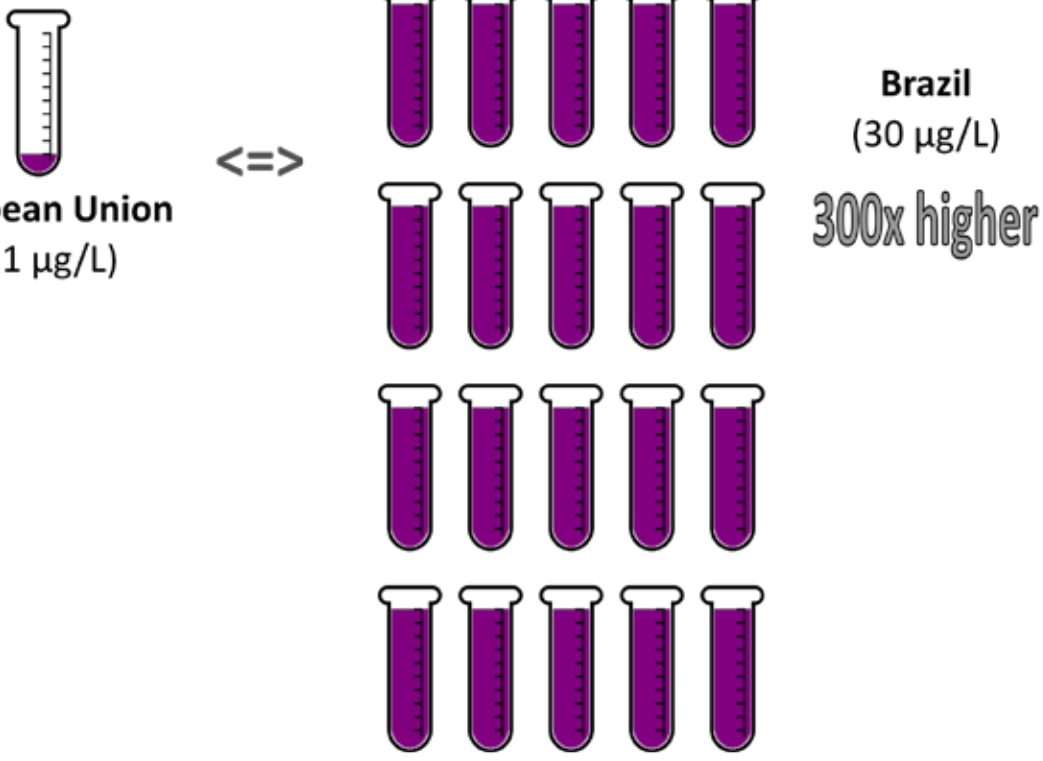
BRAZIL and EUROPEAN UNION **DRINKING WATER**

MAXIMUM RESIDUE LIMIT - MRL

(µg/L)

2.4-D

(herbicide)



European Union
(0.1 µg/L)

<=>

Brazil
(30 µg/L)

300x higher

- 2.4-D is the second best-selling pesticide in Brazil. In 2014, sales reached 36,514 tons.

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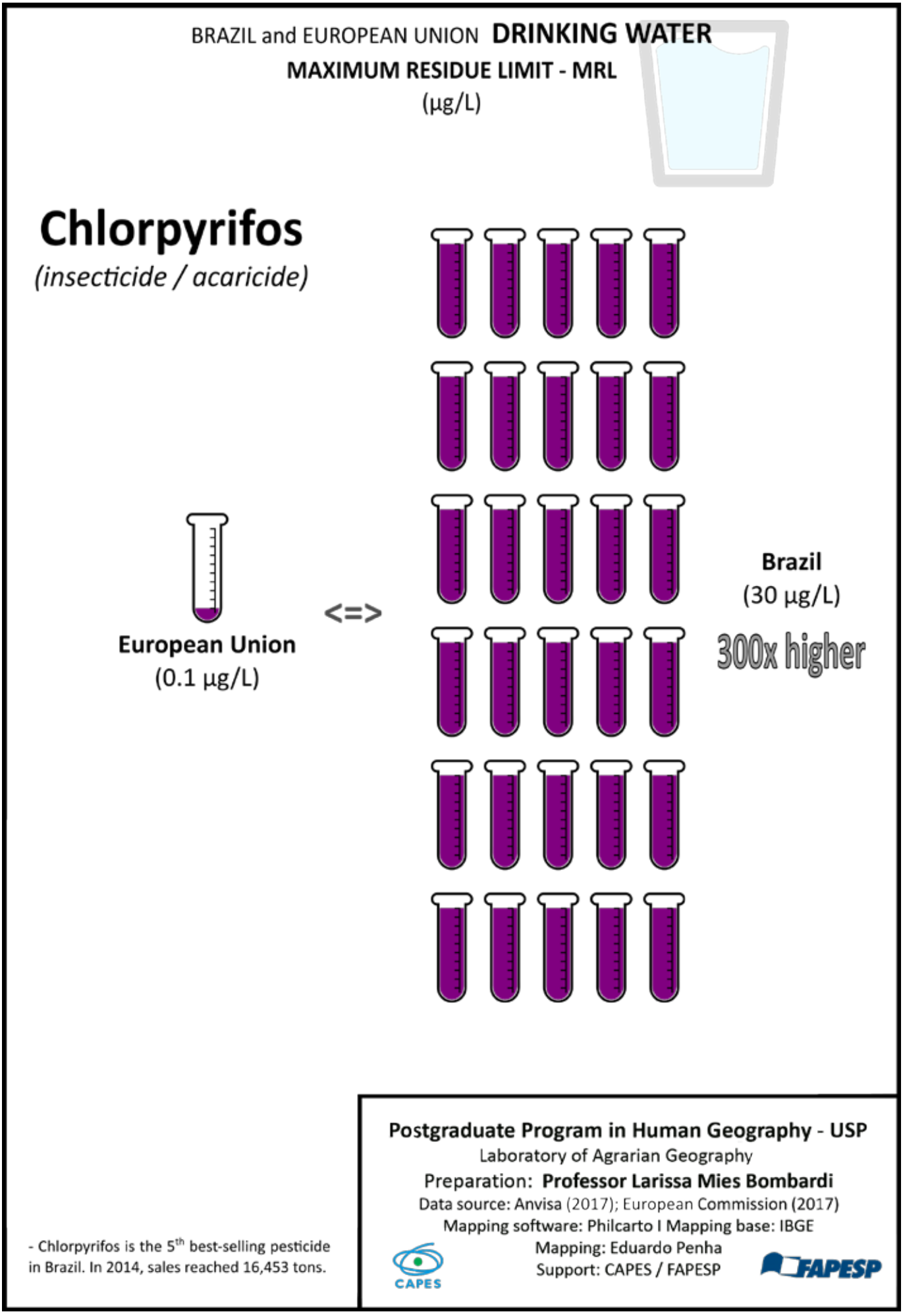

BRAZIL and EUROPEAN UNION DRINKING WATER
MAXIMUM RESIDUE LIMIT - MRL
(µg/L)
Chlorpyrifos
(insecticide / acaricide)
European Union
(0.1 µg/L)
<=>
Brazil
(30 µg/L)
300x higher
- Chlorpyrifos is the 5th best-selling pesticide in Brazil. In 2014, sales reached 16,453 tons.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

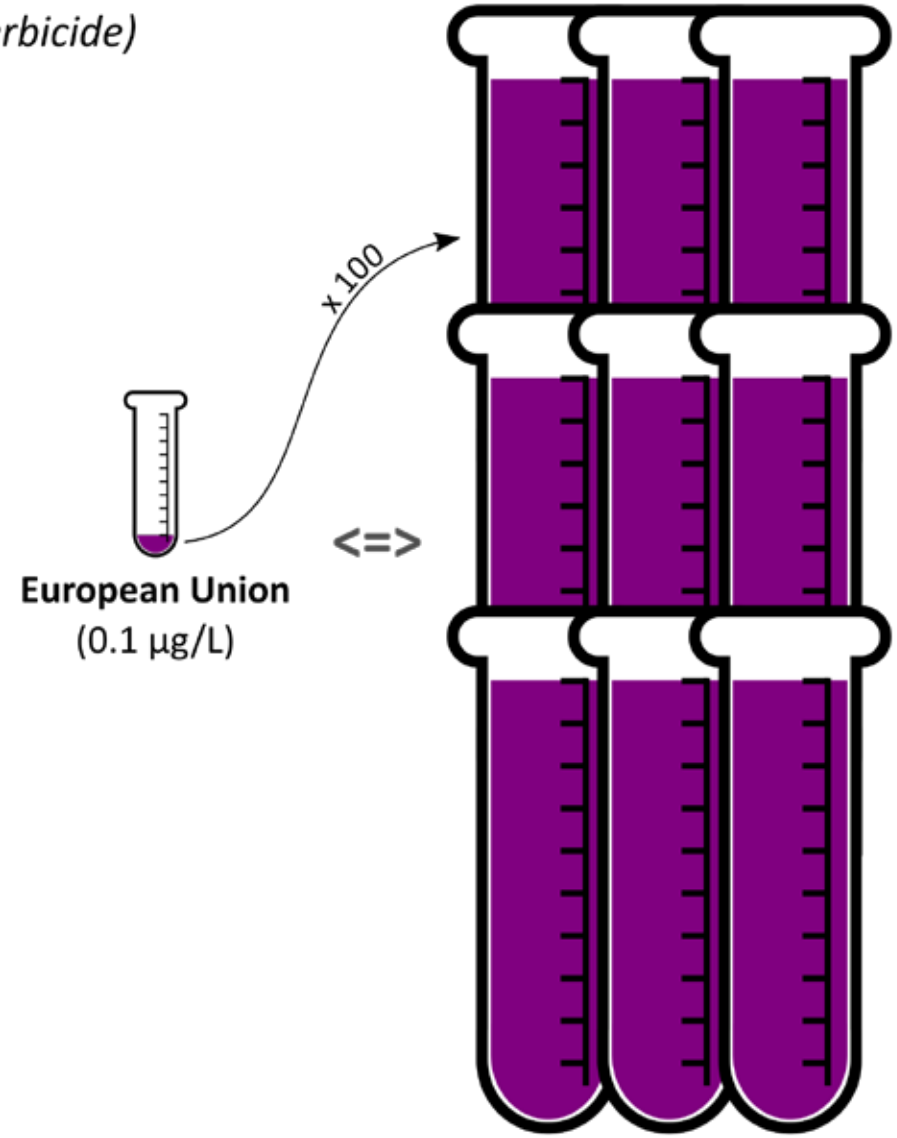
BRAZIL and EUROPEAN UNION **DRINKING WATER**

MAXIMUM RESIDUE LIMIT - MRL

(µg/L)

Diuron

(herbicide)



- Diuron is the 10th best-selling pesticide in Brazil. In 2014, sales reached 8,580 tons.

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

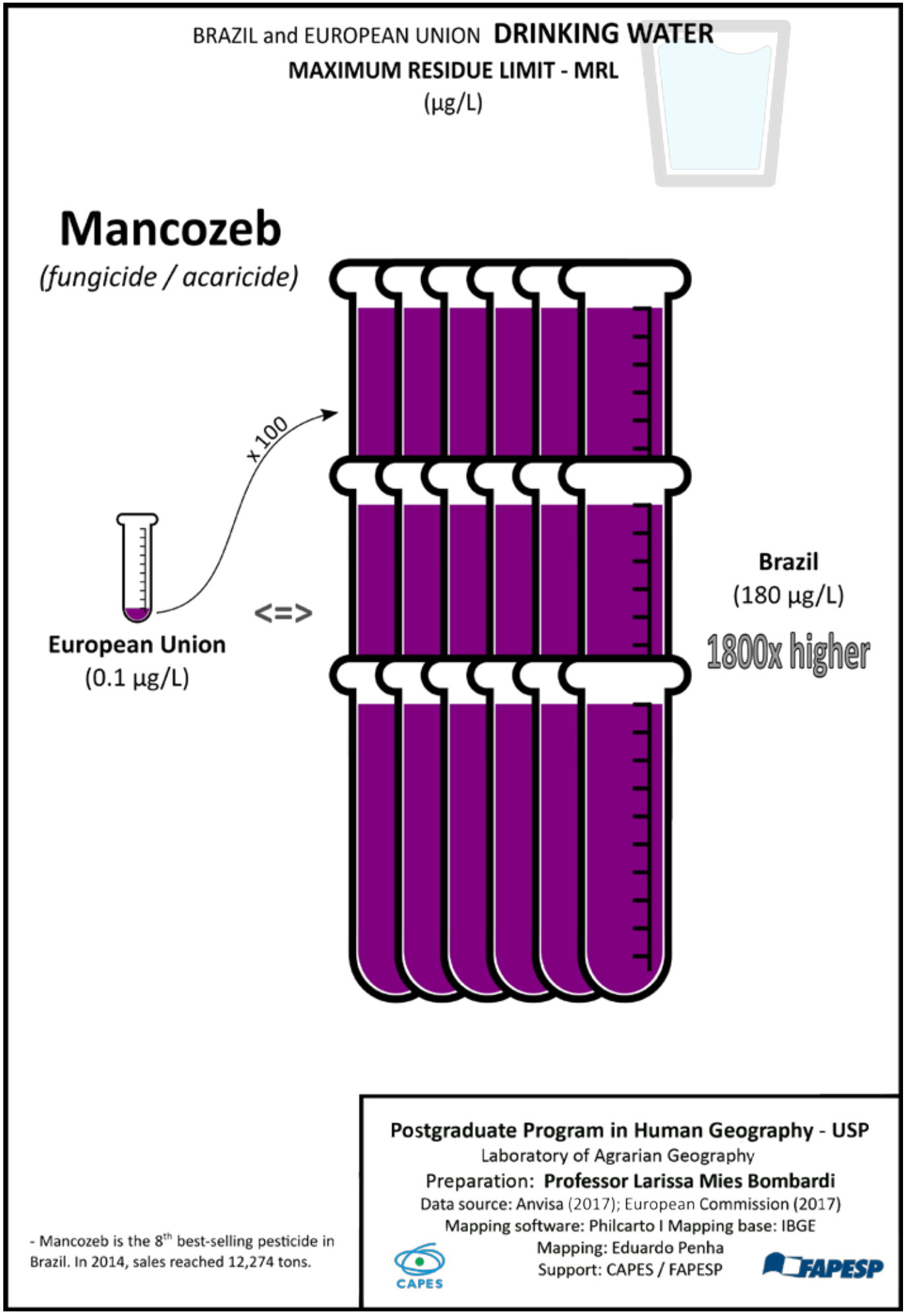
Preparation: **Professor Larissa Mies Bombardi**

Data source: Anvisa (2017); European Commission (2017)

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP


BRAZIL and EUROPEAN UNION DRINKING WATER
MAXIMUM RESIDUE LIMIT - MRL
(µg/L)
Mancozeb
(fungicide / acaricide)
x 100
<=>
European Union
(0.1 µg/L)
Brazil
(180 µg/L)
1800x higher
- Mancozeb is the 8th best-selling pesticide in Brazil. In 2014, sales reached 12,274 tons.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

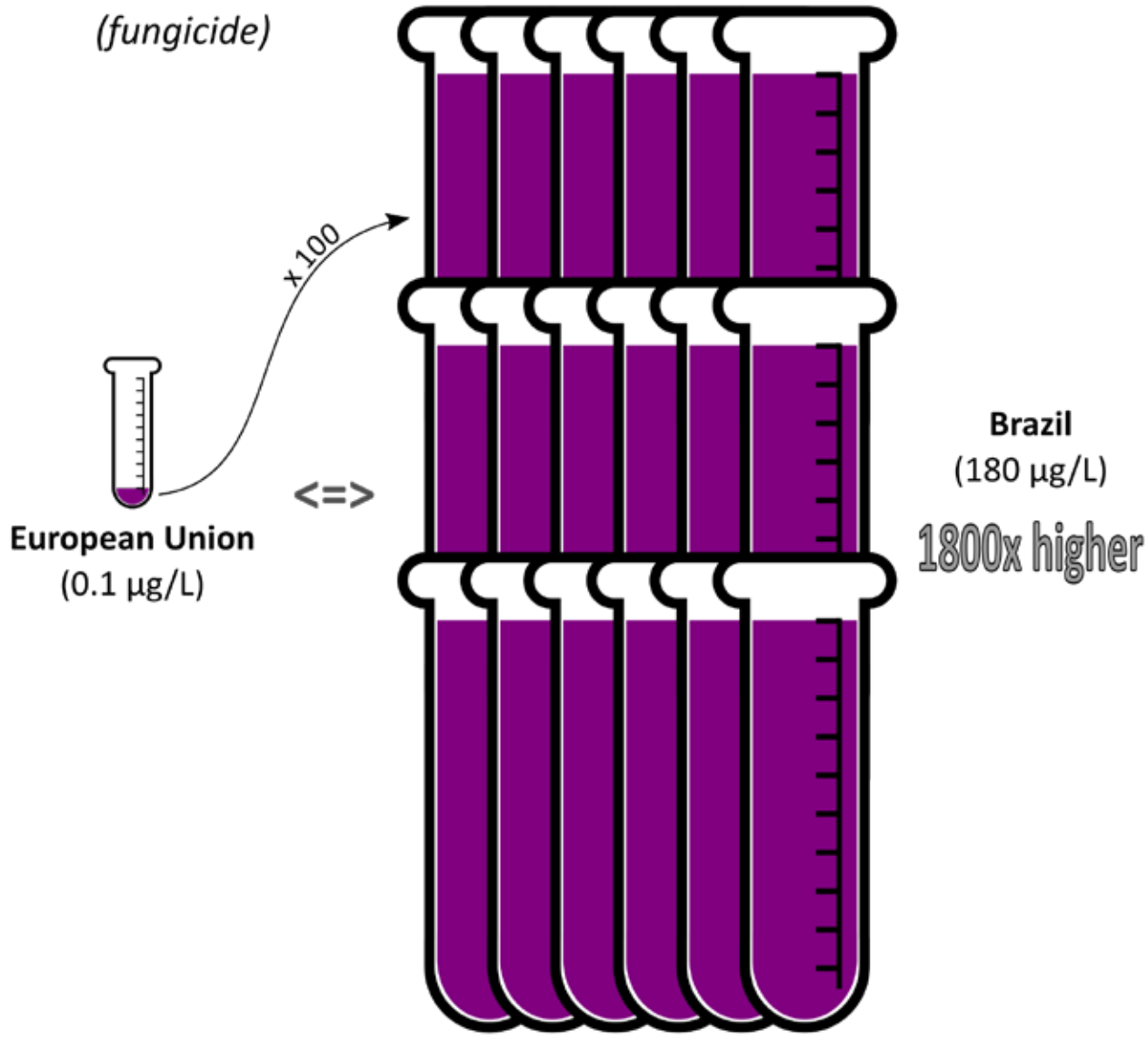
BRAZIL and EUROPEAN UNION **DRINKING WATER**

MAXIMUM RESIDUE LIMIT - MRL

(µg/L)

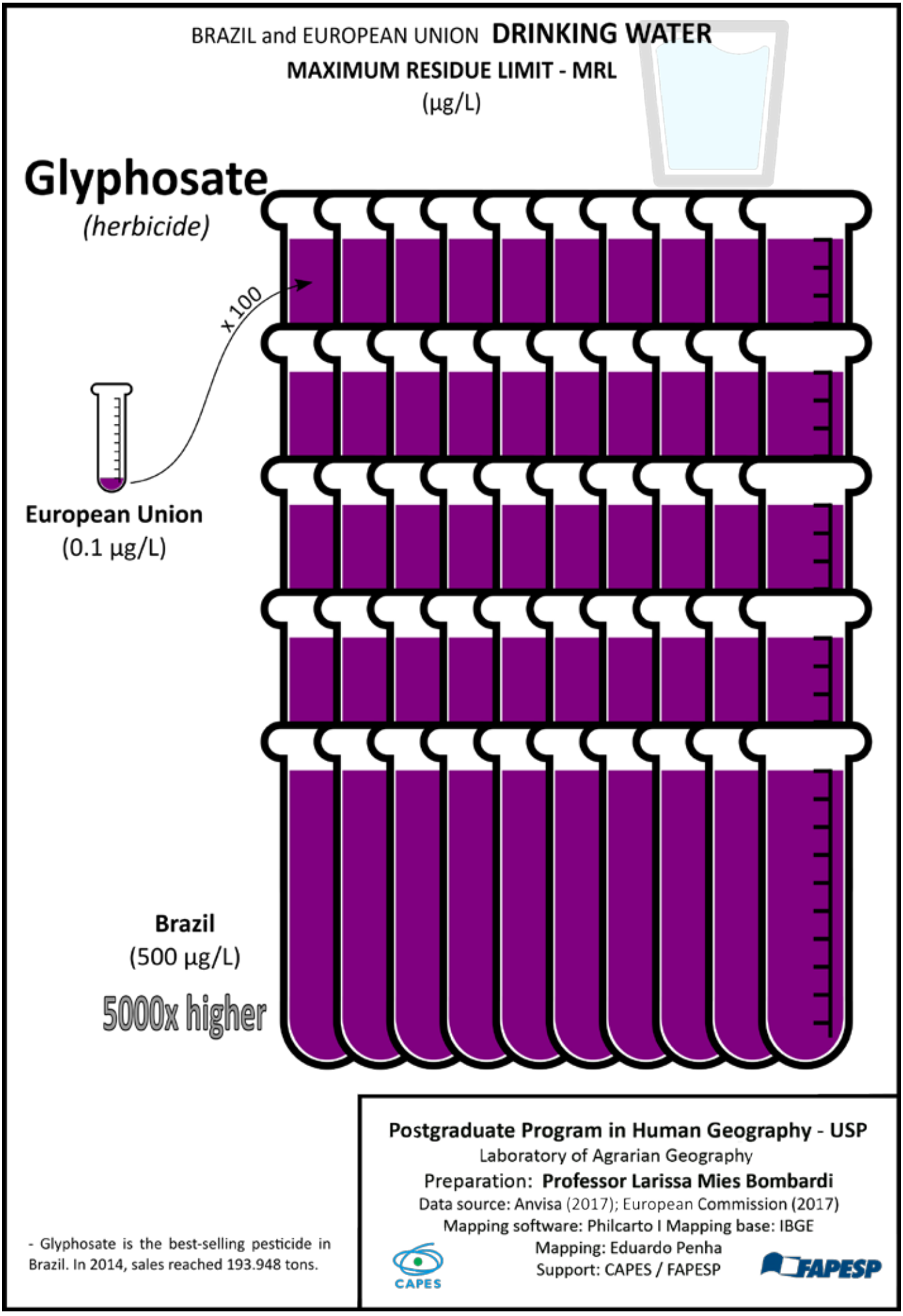
Tebuconazole

(fungicide)



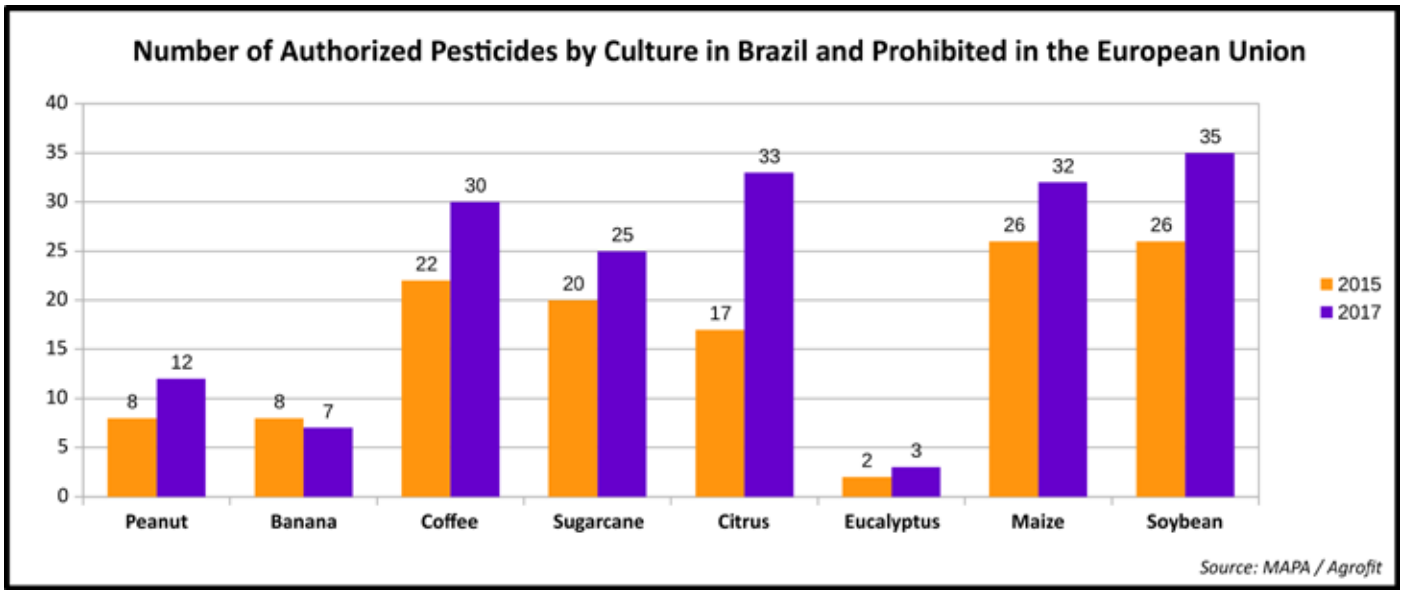
- Tebuconazole is the 22nd best-selling pesticide in Brazil. In 2014, sales reached 2,532 tons.

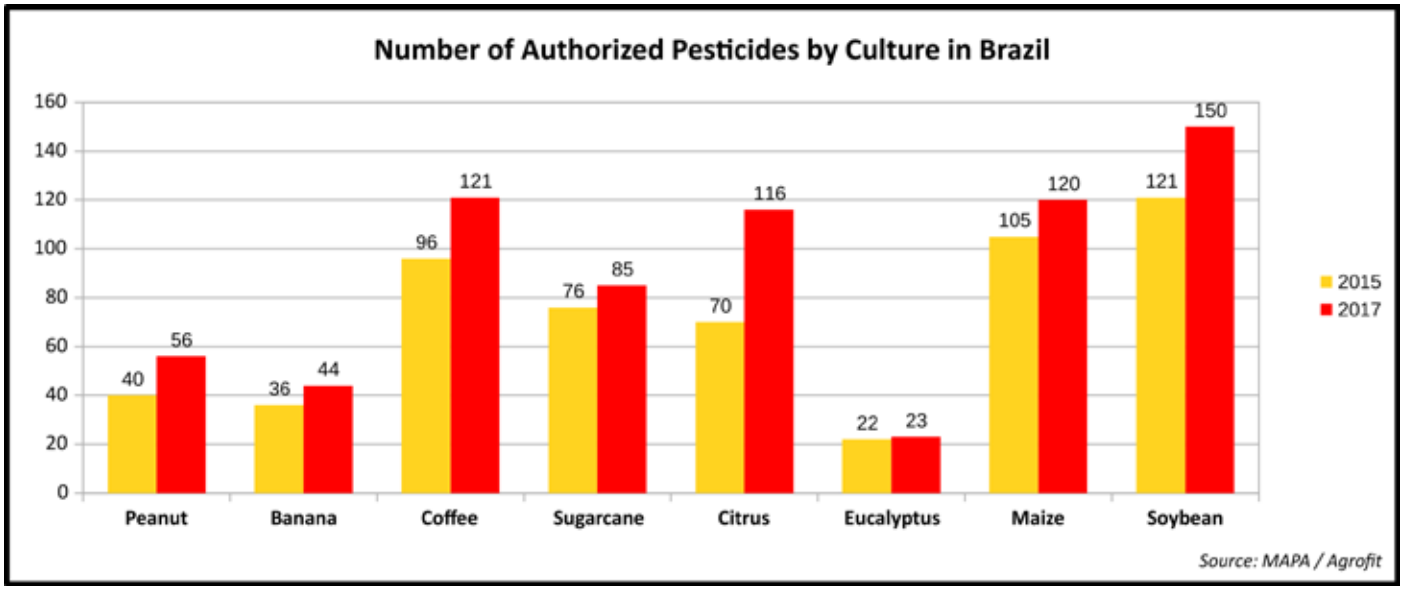
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: **Professor Larissa Mies Bombardi**
Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP


BRAZIL and EUROPEAN UNION DRINKING WATER
MAXIMUM RESIDUE LIMIT - MRL
(µg/L)
Glyphosate
(herbicide)
x 100
European Union
(0.1 µg/L)
Brazil
(500 µg/L)
5000x higher
- Glyphosate is the best-selling pesticide in Brazil. In 2014, sales reached 193.948 tons.
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: Anvisa (2017); European Commission (2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

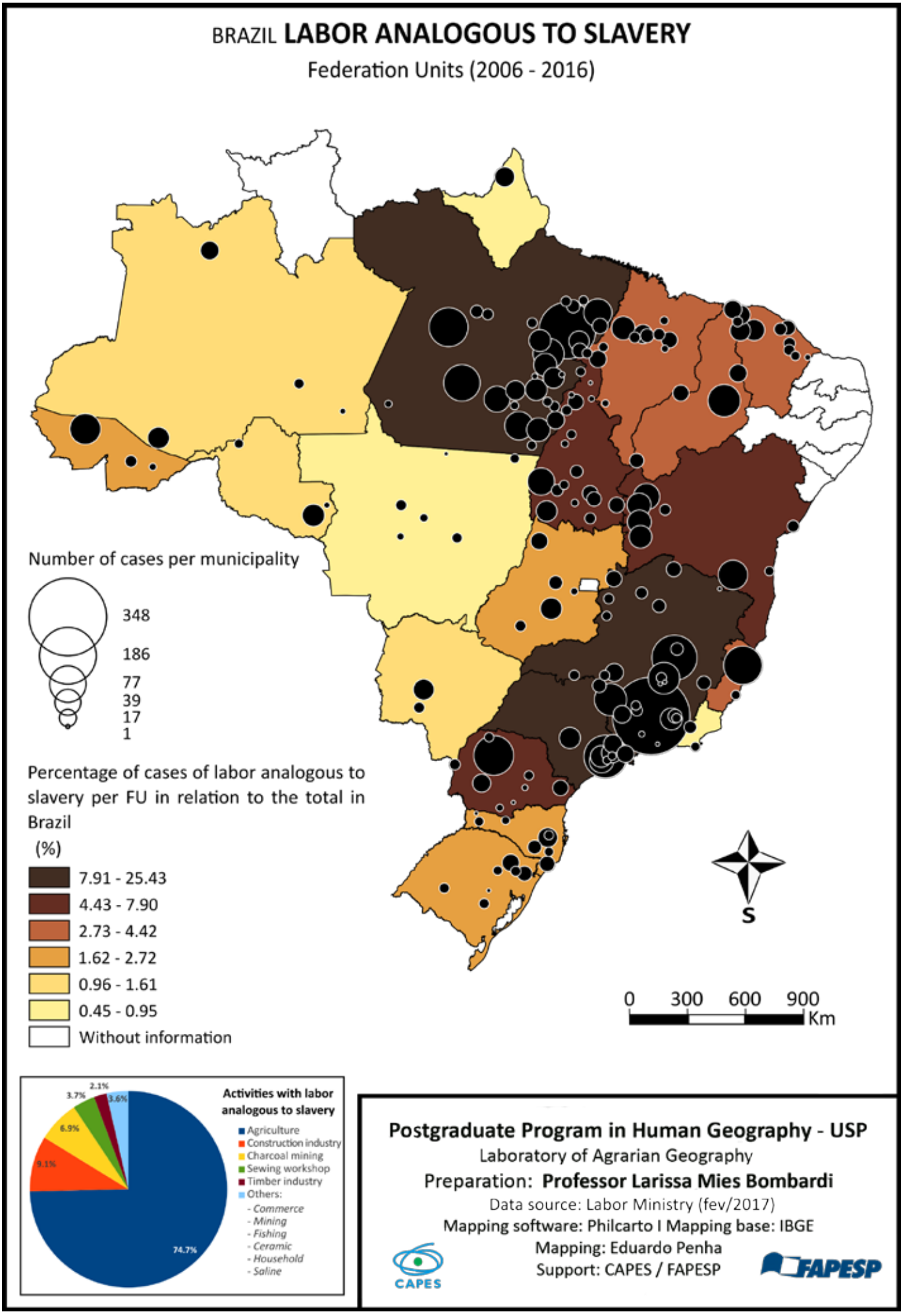
BRAZIL AND EUROPEAN UNION

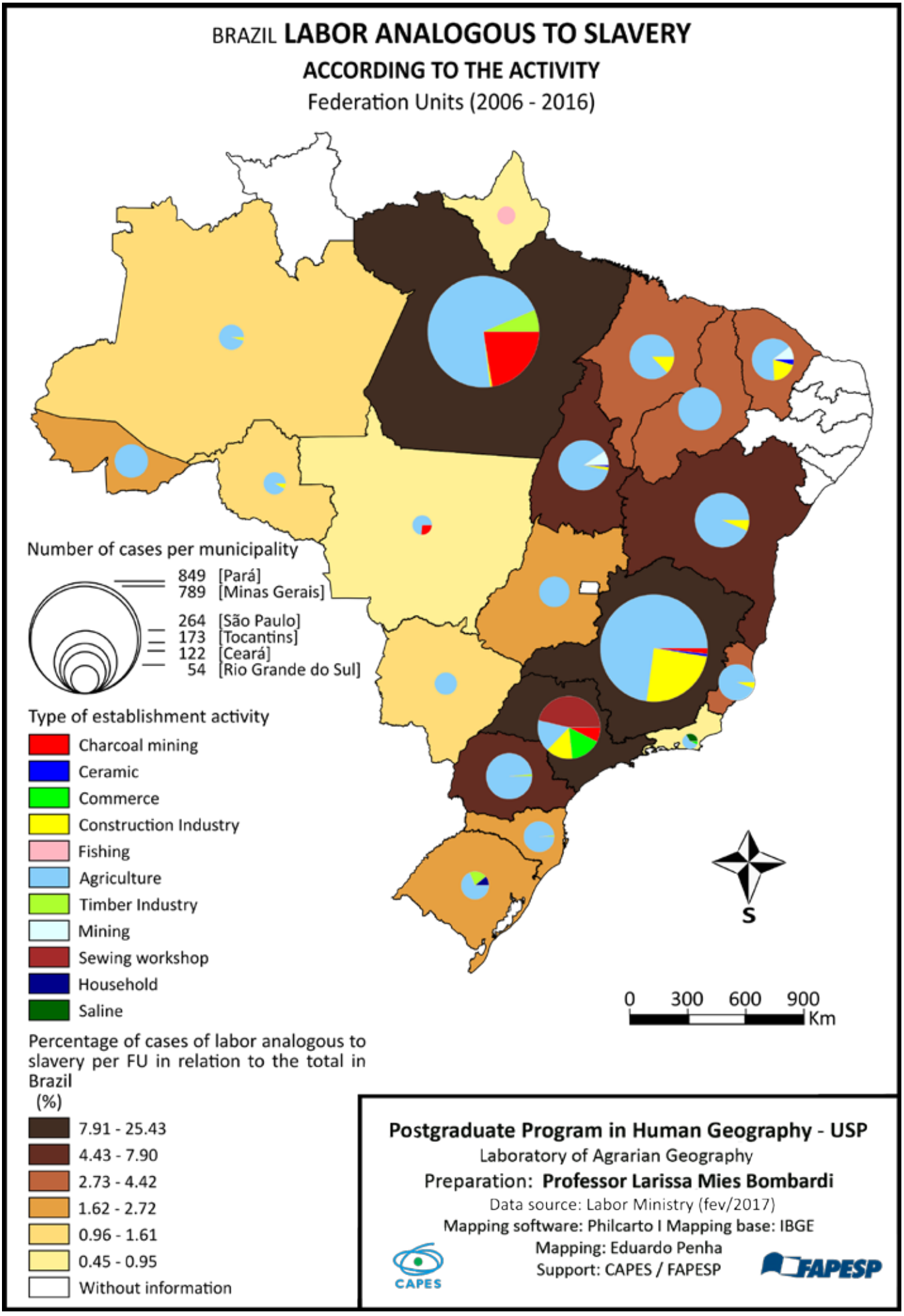
NUMBER OF AGROTOXINS AUTHORIZED PER CROP

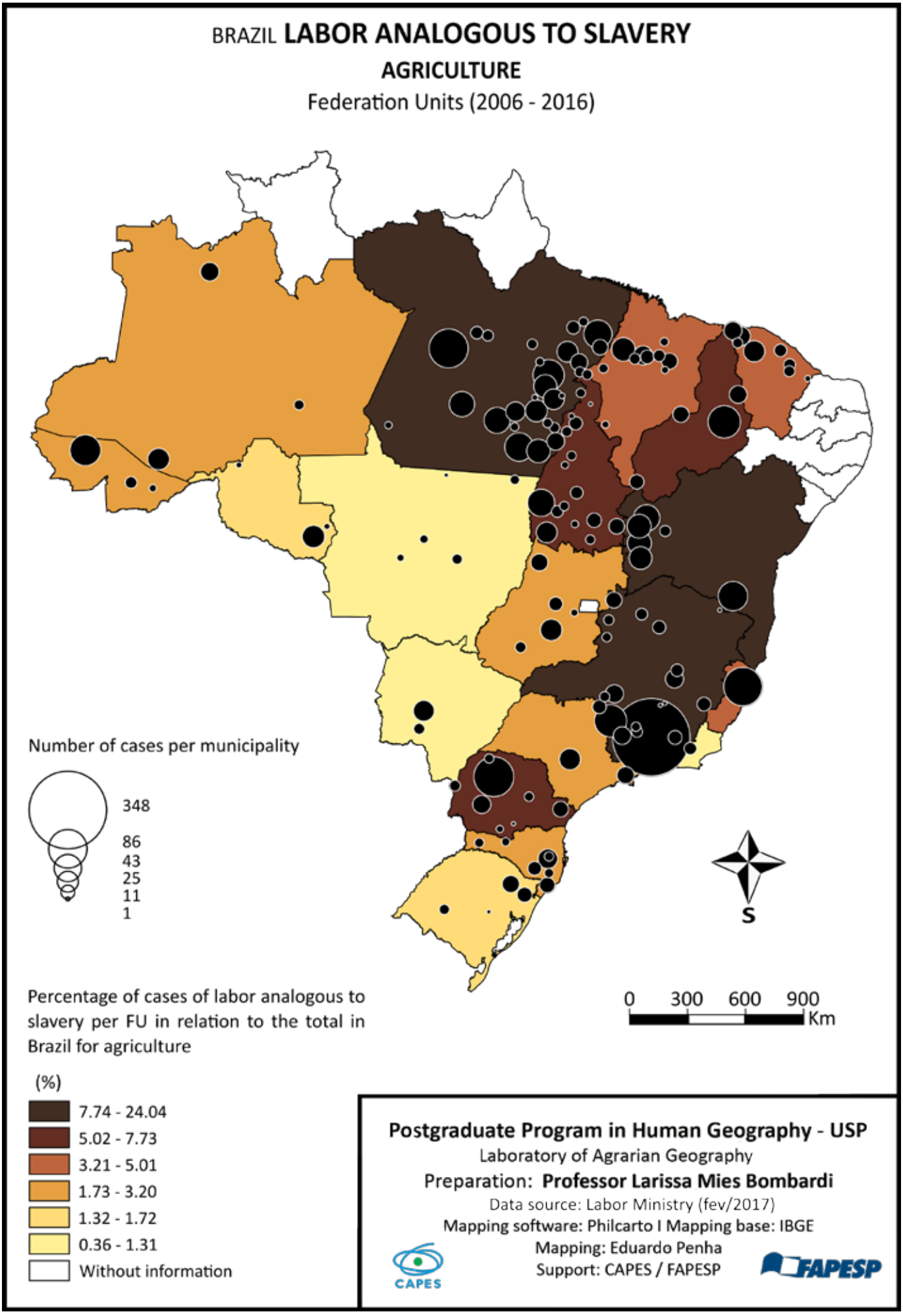

Number of Authorized Pesticides by Culture in Brazil and Prohibited in the European Union
40
35
30
25
20
15
10
5
0
8
12
8
7
22
30
20
25
17
33
2
3
26
32
26
35
Peanut
Banana
Coffee
Sugarcane
Citrus
Eucalyptus
Maize
Soybean
2015
2017
Source: MAPA / Agrofit


Number of Authorized Pesticides by Culture in Brazil
160
140
120
100
80
60
40
20
0
40
56
36
44
96
121
76
85
70
116
22
23
105
120
121
150
Peanut
Banana
Coffee
Sugarcane
Citrus
Eucalyptus
Maize
Soybean
2015
2017
Source: MAPA / Agrofit

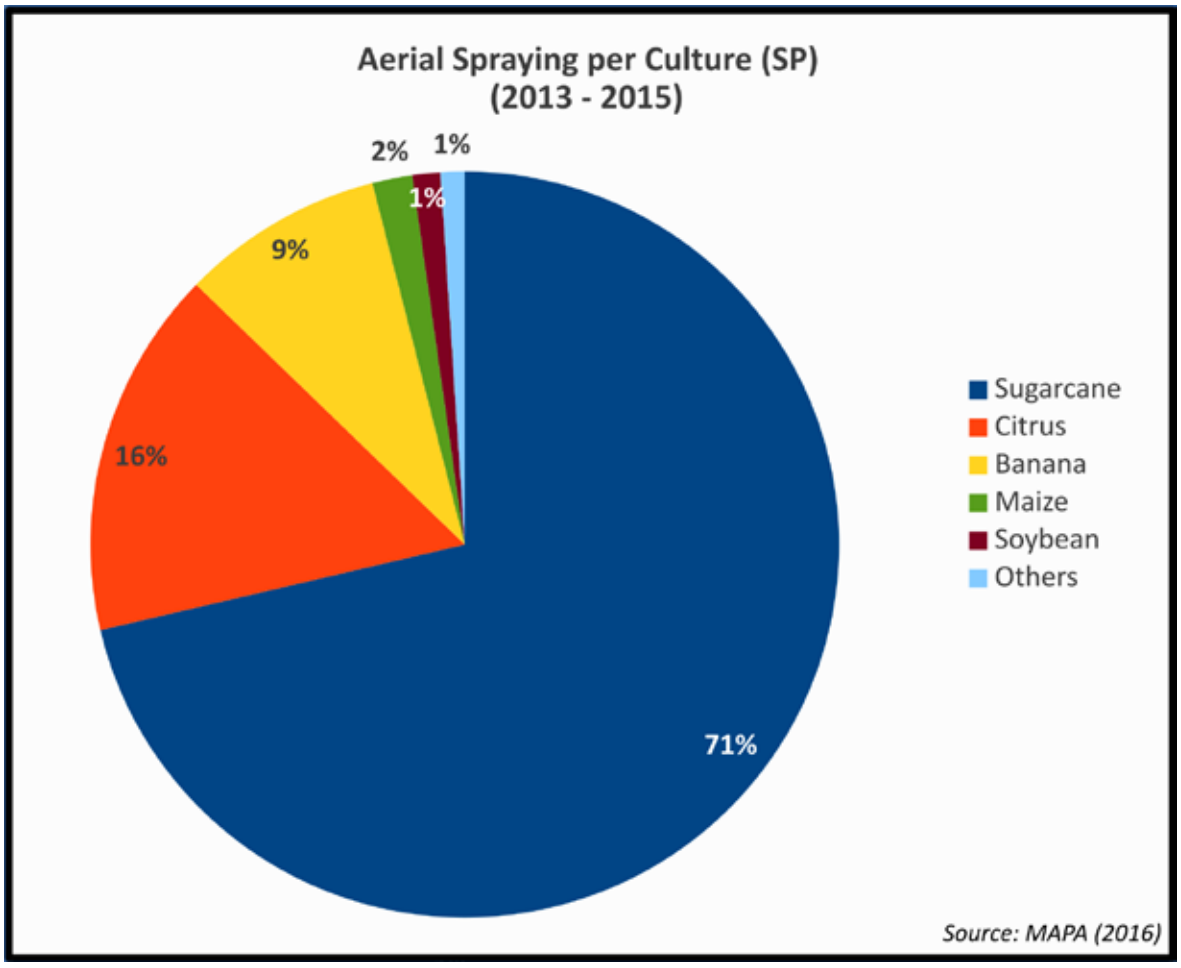
BRAZIL **LABOR ANALOGOUS TO SLAVERY**

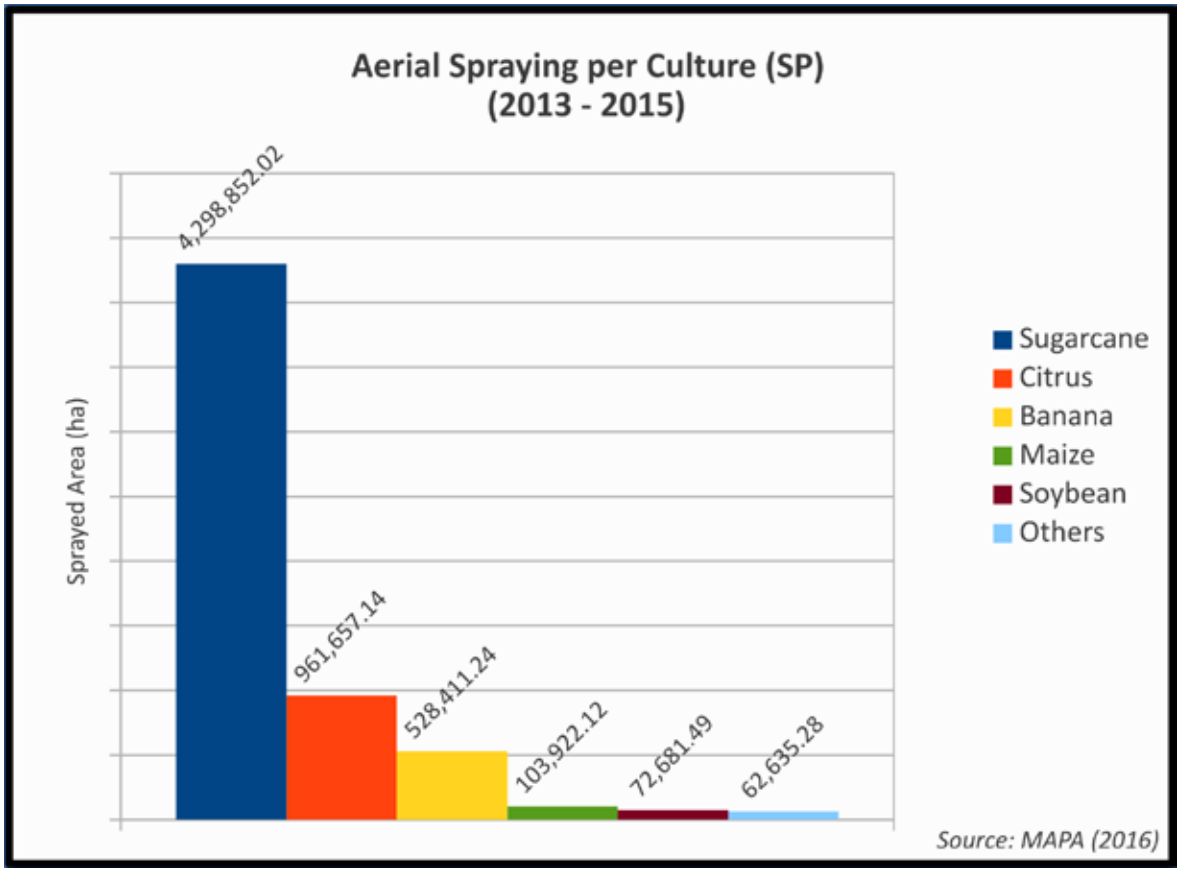

BRAZIL LABOR ANALOGOUS TO SLAVERY
Federation Units (2006 - 2016)
Number of cases per municipality
348
186
77
39
17
1
Percentage of cases of labor analogous to slavery per FU in relation to the total in Brazil
(%)
7.91 - 25.43
4.43 - 7.90
2.73 - 4.42
1.62 - 2.72
0.96 - 1.61
0.45 - 0.95
Without information
S
0 300 600 900
Km
Activities with labor analogous to slavery
Agriculture
Construction industry
Charcoal mining
Sewing workshop
Timber industry
Others:
- Commerce
- Mining
- Fishing
- Ceramic
- Household
- Saline
74.7%
9.1%
6.9%
3.7%
2.1%
3.6%
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: Labor Ministry (fev/2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

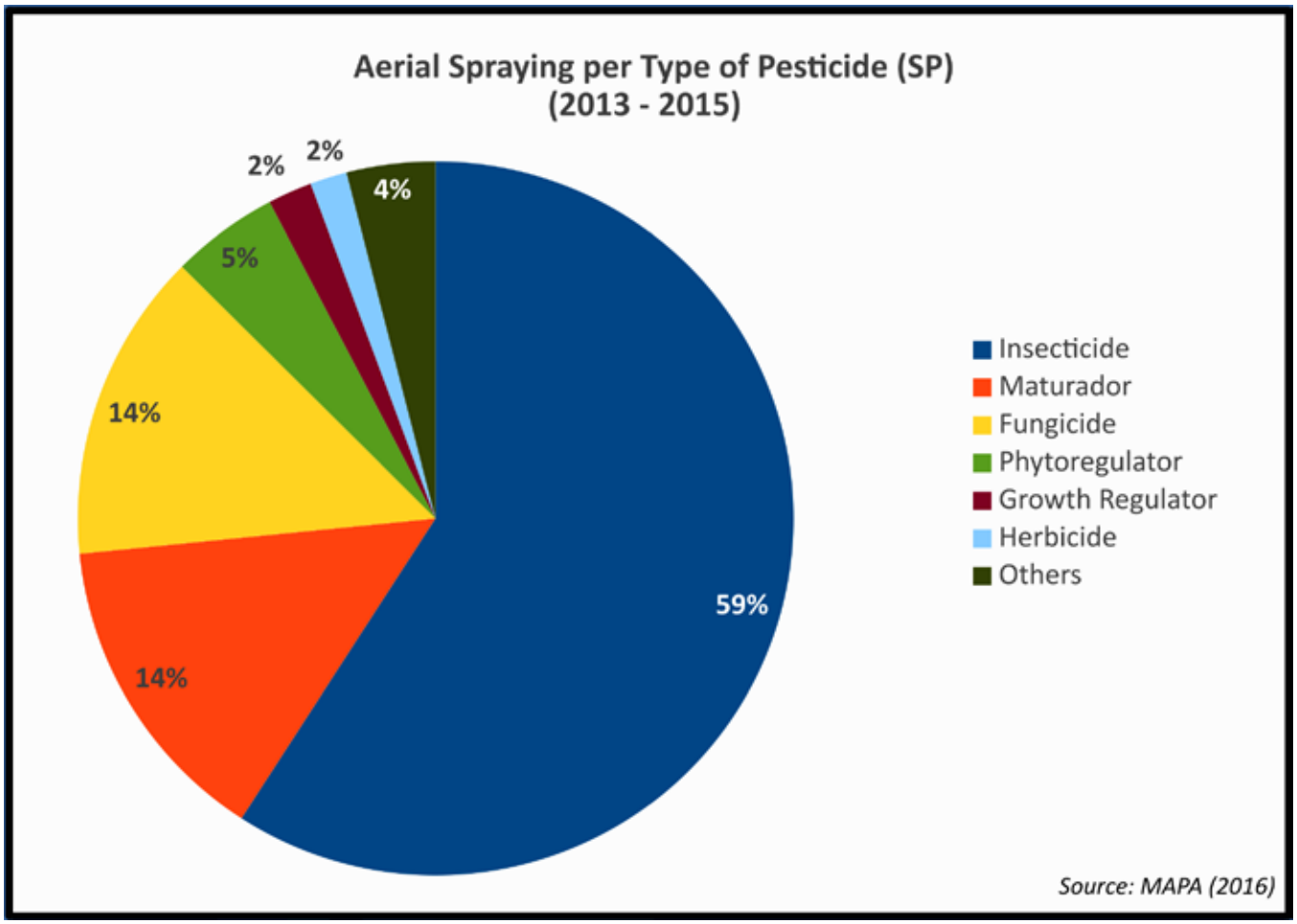

BRAZIL LABOR ANALOGOUS TO SLAVERY
ACCORDING TO THE ACTIVITY
Federation Units (2006 - 2016)
Number of cases per municipality
849 [Pará]
789 [Minas Gerais]
264 [São Paulo]
173 [Tocantins]
122 [Ceará]
54 [Rio Grande do Sul]
Type of establishment activity
Charcoal mining
Ceramic
Commerce
Construction Industry
Fishing
Agriculture
Timber Industry
Mining
Sewing workshop
Household
Saline
Percentage of cases of labor analogous to slavery per FU in relation to the total in Brazil
(%)
7.91 - 25.43
4.43 - 7.90
2.73 - 4.42
1.62 - 2.72
0.96 - 1.61
0.45 - 0.95
Without information
S
0 300 600 900
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: Labor Ministry (fev/2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

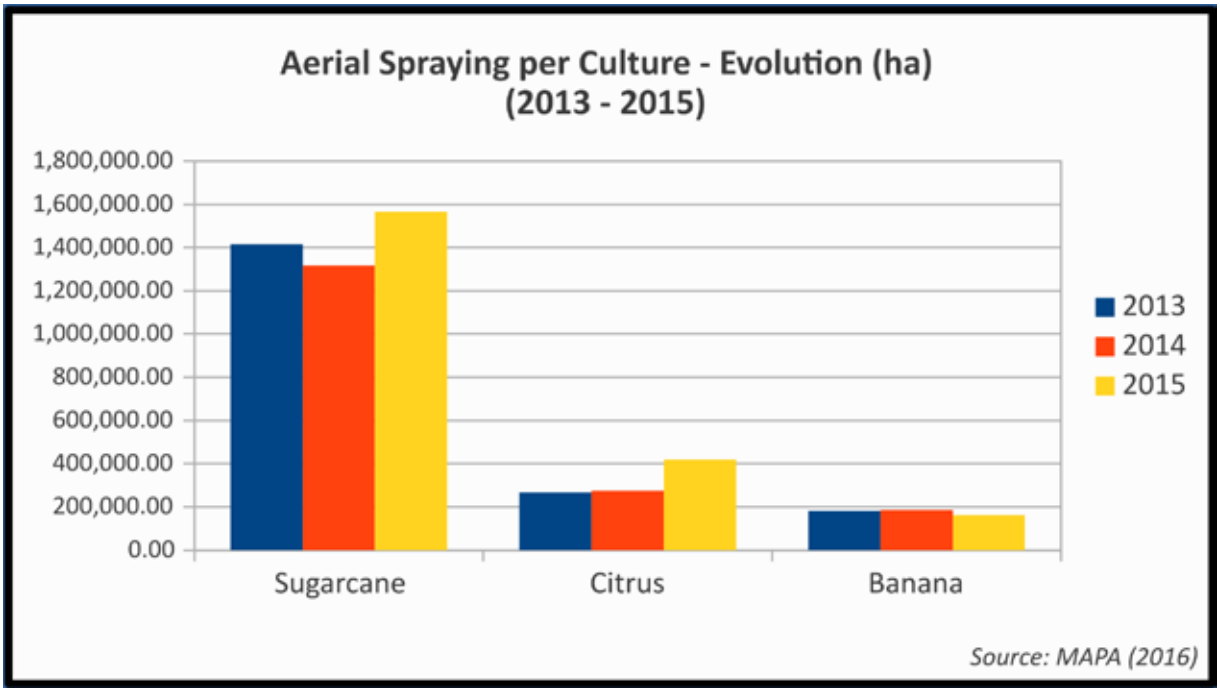

BRAZIL LABOR ANALOGOUS TO SLAVERY
AGRICULTURE
Federation Units (2006 - 2016)
Number of cases per municipality
348
86
43
25
11
1
S
0 300 600 900
Km
Percentage of cases of labor analogous to slavery per FU in relation to the total in Brazil for agriculture
(%)
7.74 - 24.04
5.02 - 7.73
3.21 - 5.01
1.73 - 3.20
1.32 - 1.72
0.36 - 1.31
Without information
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: Labor Ministry (fev/2017)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

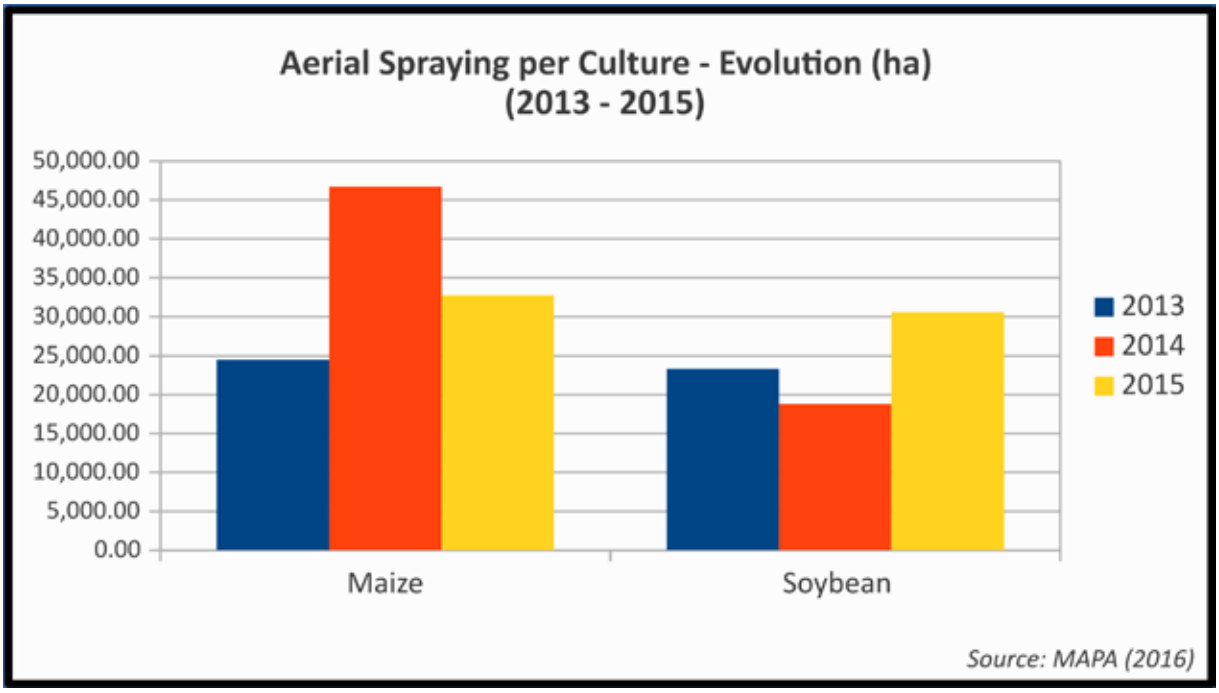
BRAZIL **AERIAL SPRAYING OF AGROTOXIN**

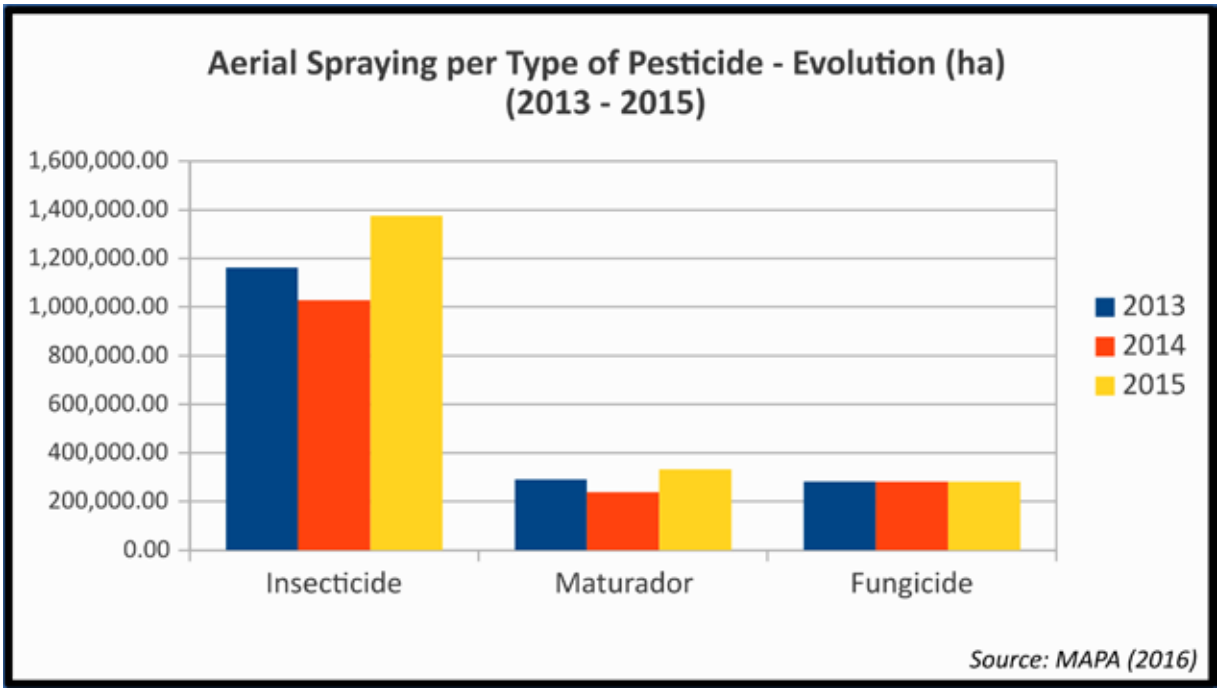

Aerial Spraying per Culture (SP)
(2013 - 2015)
2%
1%
1%
9%
16%
71%
Sugarcane
Citrus
Banana
Maize
Soybean
Others
Source: MAPA (2016)

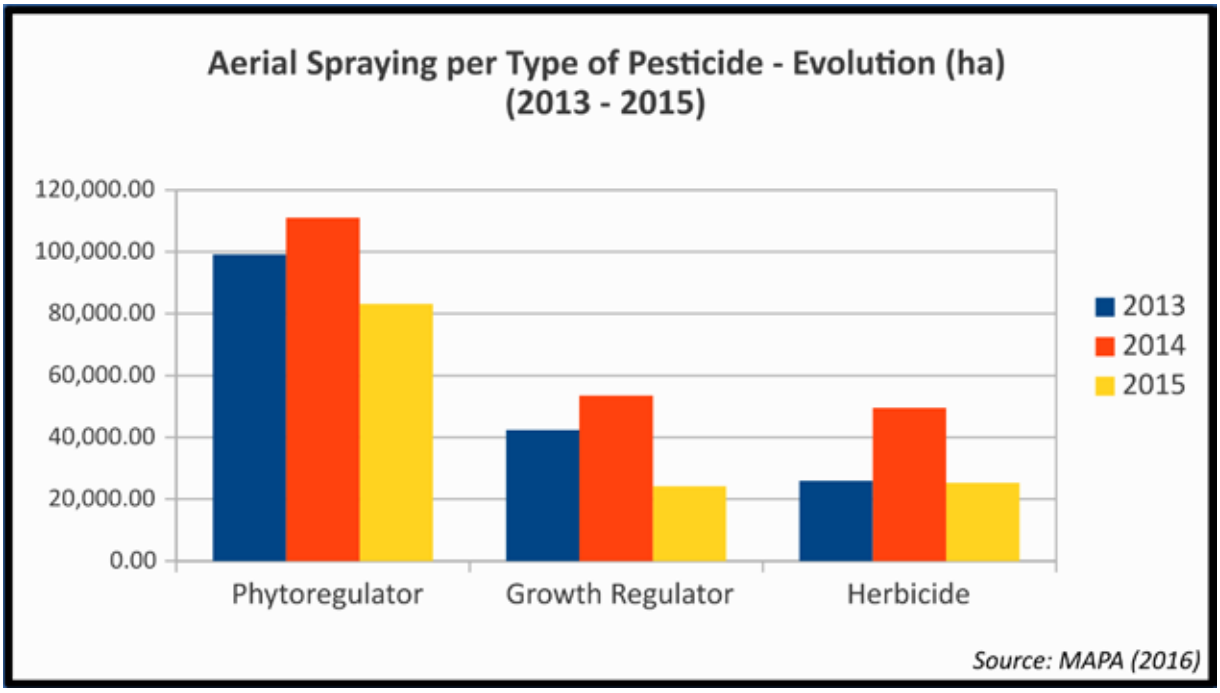

Aerial Spraying per Culture (SP)
(2013 - 2015)
Sprayed Area (ha)
4,298,852.02
961,657.14
528,411.24
103,922.12
72,681.49
62,635.28
Sugarcane
Citrus
Banana
Maize
Soybean
Others
Source: MAPA (2016)


Aerial Spraying per Type of Pesticide (SP)
(2013 - 2015)
59%
14%
14%
5%
2%
2%
4%
Insecticide
Maturador
Fungicide
Phytoregulator
Growth Regulator
Herbicide
Others
Source: MAPA (2016)


Aerial Spraying per Culture - Evolution (ha)
(2013 - 2015)
1,800,000.00
1,600,000.00
1,400,000.00
1,200,000.00
1,000,000.00
800,000.00
600,000.00
400,000.00
200,000.00
0.00
Sugarcane
Citrus
Banana
2013
2014
2015
Source: MAPA (2016)


Aerial Spraying per Culture - Evolution (ha)
(2013 - 2015)
50,000.00
45,000.00
40,000.00
35,000.00
30,000.00
25,000.00
20,000.00
15,000.00
10,000.00
5,000.00
0.00
Maize
Soybean
2013
2014
2015
Source: MAPA (2016)

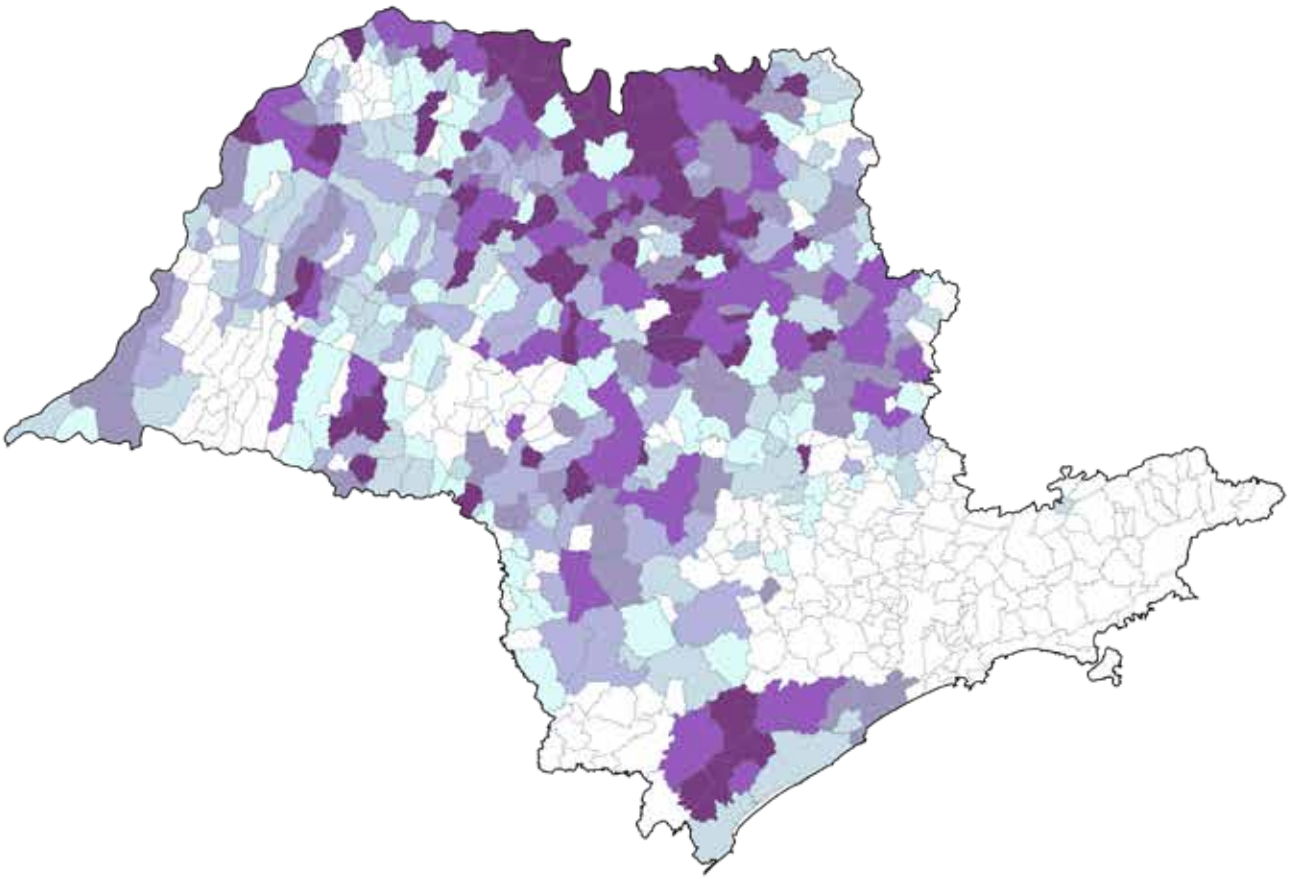

Aerial Spraying per Type of Pesticide - Evolution (ha)
(2013 - 2015)
1,600,000.00
1,400,000.00
1,200,000.00
1,000,000.00
800,000.00
600,000.00
400,000.00
200,000.00
0.00
Insecticide
Maturador
Fungicide
2013
2014
2015
Source: MAPA (2016)


Aerial Spraying per Type of Pesticide - Evolution (ha)
(2013 - 2015)
120,000.00
100,000.00
80,000.00
60,000.00
40,000.00
20,000.00
0.00
Phytoregulator
Growth Regulator
Herbicide
2013
2014
2015
Source: MAPA (2016)

SÃO PAULO **AERIAL SPRAYING OF AGROTOXINS**

OF PLANTATIONS (2013 - 2015)

Municipalities



Sum of sprayed areas between the years of 2013 to 2015 in relation to the area in the municipality where the spraying occurred

(%)

- 63.67 - 836.80
- 21.30 - 63.66
- 9.50 - 21.29
- 3.66 - 9.45
- 1.21 - 3.65
- 0.04 - 1.20
- Without Use

S

0 60 120 180 Km

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: MAPA (2016)

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

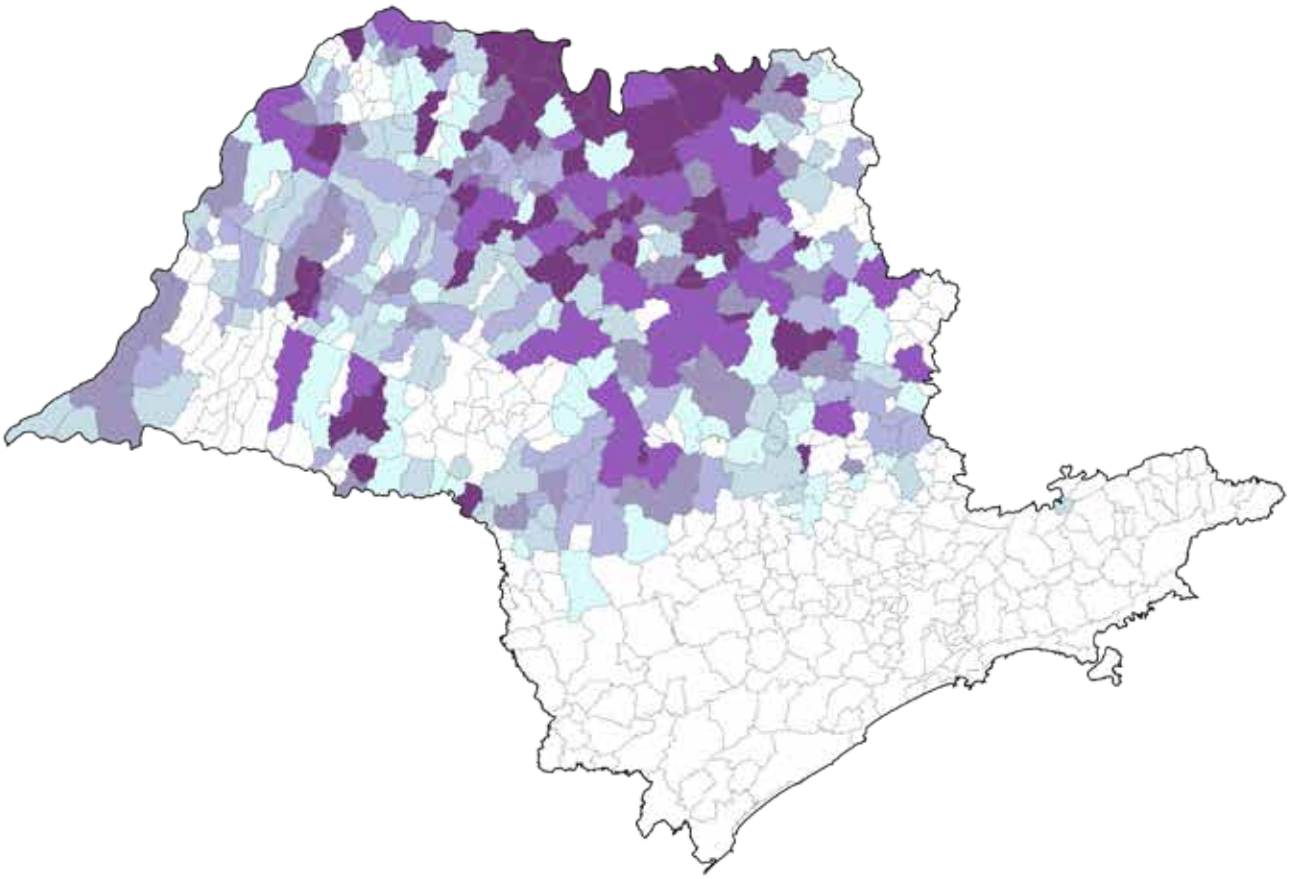
Support: CAPES / FAPESP

CAPES FAPESP

SÃO PAULO **AERIAL SPRAYING OF AGROTOXINS**

SUGARCANE PLANTATION (2013 - 2015)

Municipalities



Sum of sprayed areas between the years of 2013 and 2015 in relation to the area in the municipality where the spraying occurred

(%)

- 49.83 - 757.10
- 17.72 - 49.82
- 7.54 - 17.71
- 2.83 - 7.53
- 1.12 - 2.82
- 0.02 - 1.11
- Without Use

S

0 60 120 180 Km

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

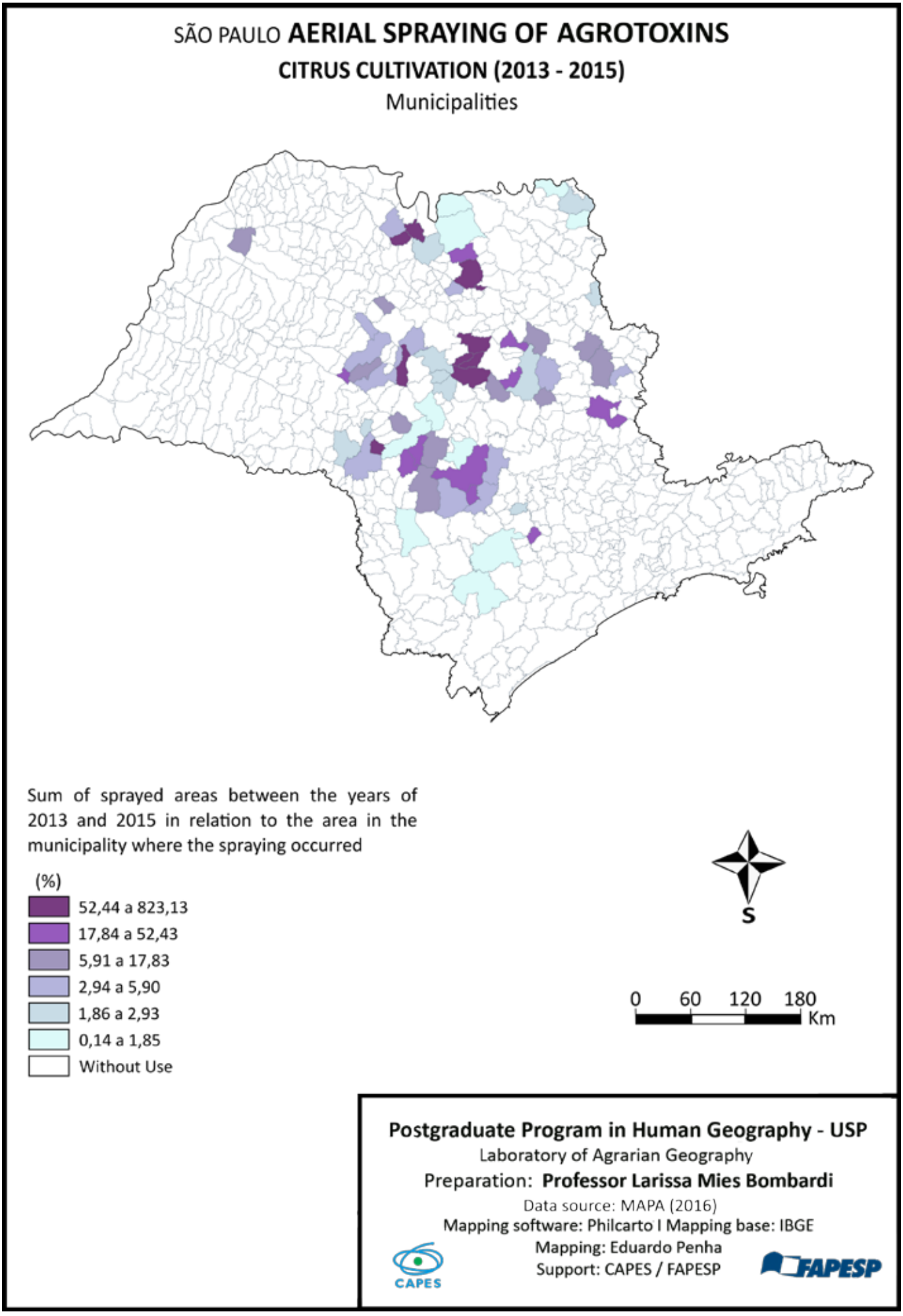
Preparation: **Professor Larissa Mies Bombardi**

Data source: MAPA (2016)

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

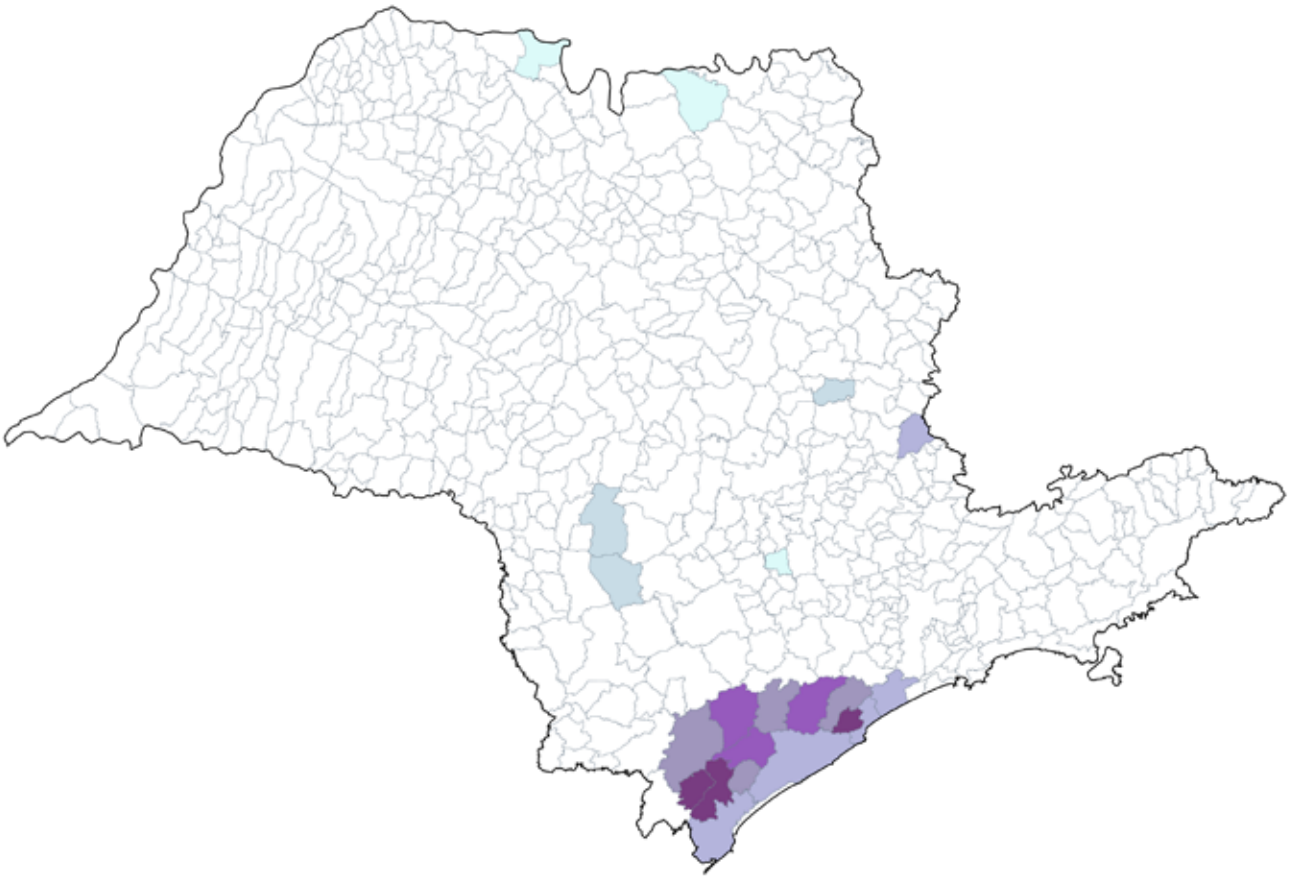
Support: CAPES / FAPESP


SÃO PAULO AERIAL SPRAYING OF AGROTOXINS
CITRUS CULTIVATION (2013 - 2015)
Municipalities
Sum of sprayed areas between the years of 2013 and 2015 in relation to the area in the municipality where the spraying occurred
(%)
52,44 a 823,13
17,84 a 52,43
5,91 a 17,83
2,94 a 5,90
1,86 a 2,93
0,14 a 1,85
Without Use
S
0 60 120 180
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: MAPA (2016)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

SÃO PAULO **AERIAL SPRAYING OF AGROTOXINS**

BANANA PLANTATION (2013 - 2015)

Municipalities



Sum of sprayed areas between the years of 2013 and 2015 in relation to the area in the municipality where the spraying occurred

(%)

- 112.89 - 126.37
- 60.90 - 112.88
- 18.44 - 60.89
- 2.14 - 18.43
- 0.25 - 2.13
- 0.01 - 0.24
- Without Use

S

0 60 120 180 Km

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

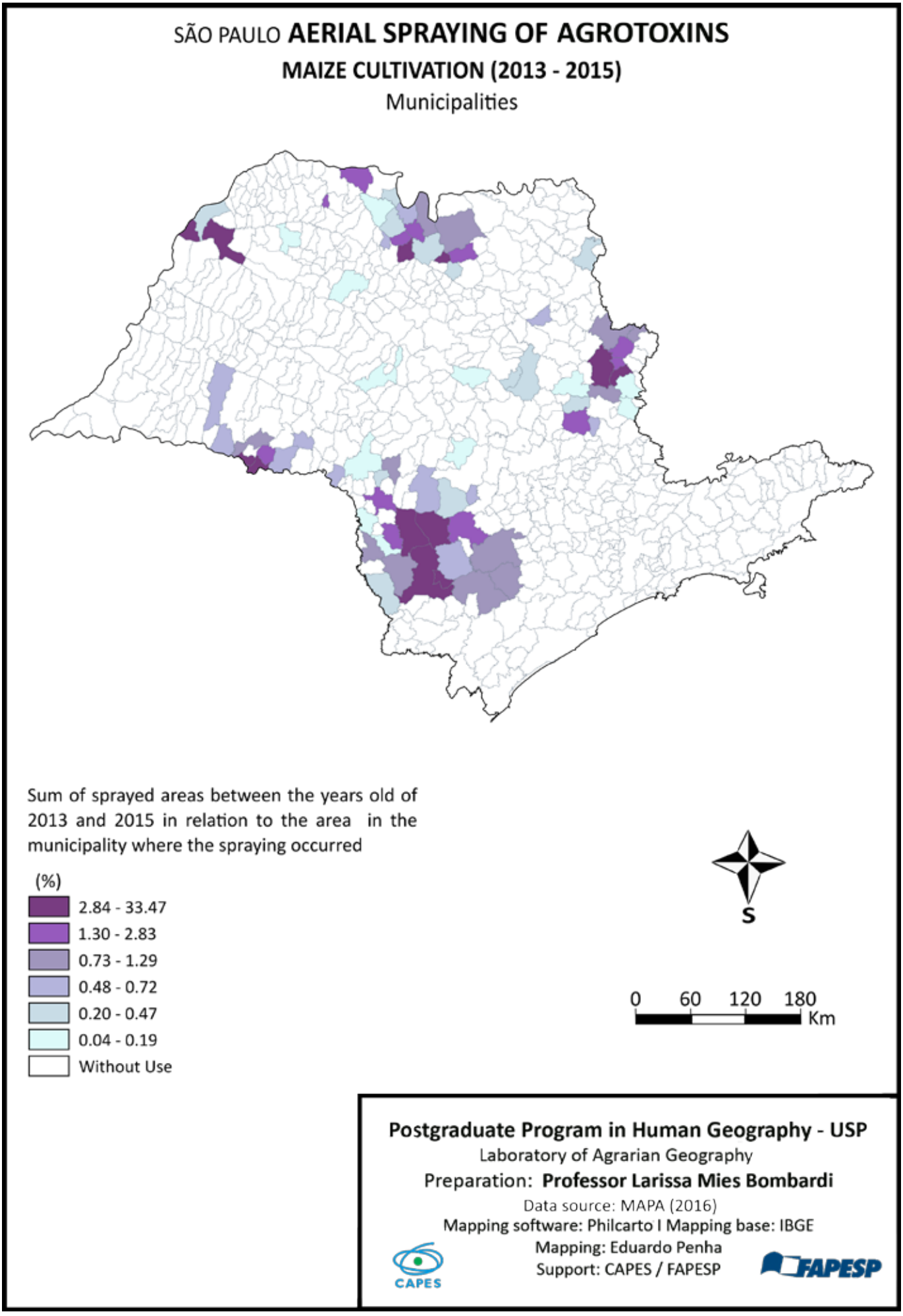
Preparation: **Professor Larissa Mies Bombardi**

Data source: MAPA (2016)

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

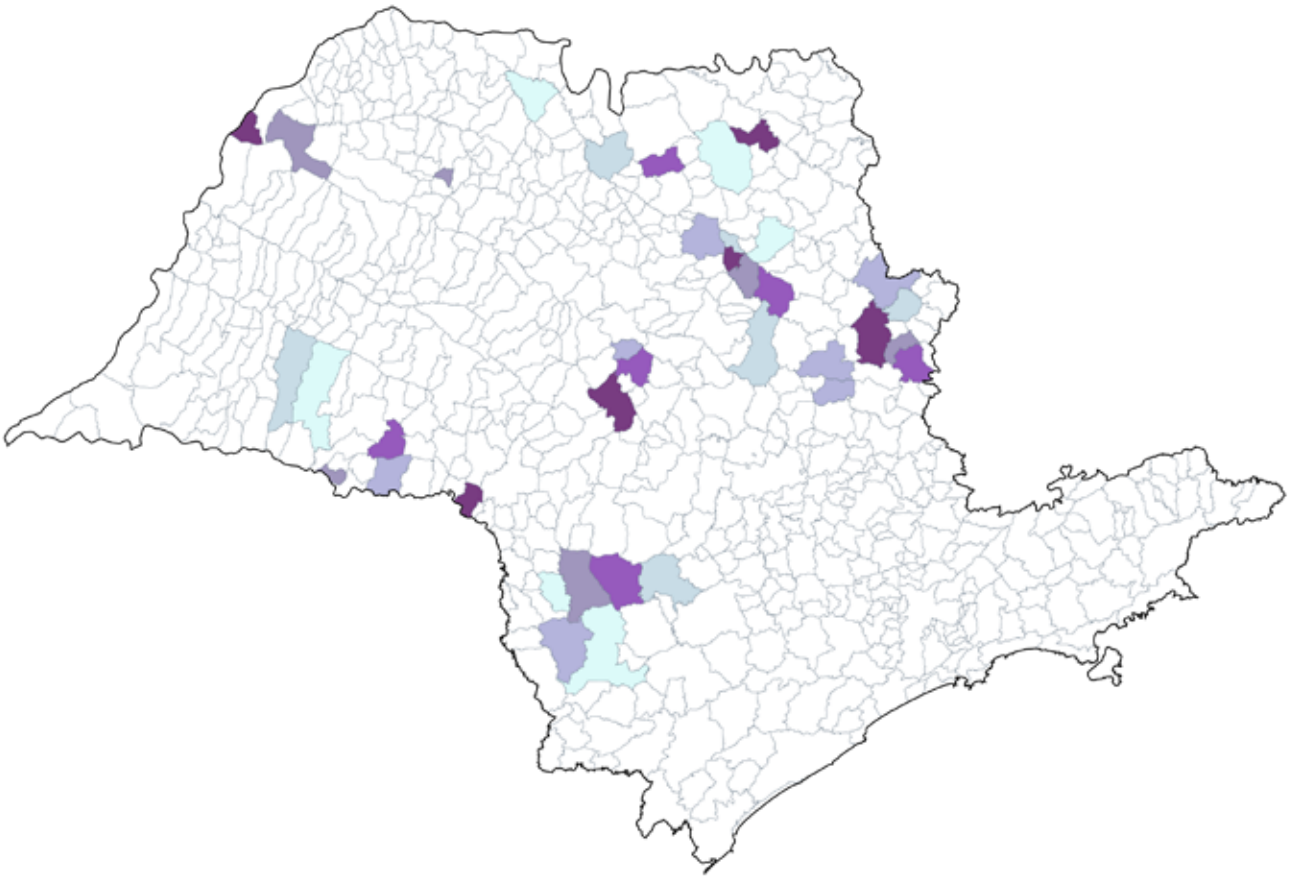
Support: CAPES / FAPESP


SÃO PAULO AERIAL SPRAYING OF AGROTOXINS
MAIZE CULTIVATION (2013 - 2015)
Municipalities
Sum of sprayed areas between the years old of 2013 and 2015 in relation to the area in the municipality where the spraying occurred
(%)
2.84 - 33.47
1.30 - 2.83
0.73 - 1.29
0.48 - 0.72
0.20 - 0.47
0.04 - 0.19
Without Use
S
0 60 120 180
Km
Postgraduate Program in Human Geography - USP
Laboratory of Agrarian Geography
Preparation: Professor Larissa Mies Bombardi
Data source: MAPA (2016)
Mapping software: Philcarto I Mapping base: IBGE
Mapping: Eduardo Penha
Support: CAPES / FAPESP
CAPES
FAPESP

SÃO PAULO **AERIAL SPRAYING OF AGROTOXINS**

SOYBEAN CULTIVATION (2013 - 2015)

Municipalities



Sum of sprayed areas between the years of 2013 and 2015 in relation to the area in the municipality where the spraying occurred

(%)

- 2.84 - 84.08
- 1.13 - 2.83
- 0.68 - 1.12
- 0.31 - 0.67
- 0.18 - 0.30
- 0.04 - 0.17
- Without Use

S

0 60 120 180 Km

Postgraduate Program in Human Geography - USP

Laboratory of Agrarian Geography

Preparation: **Professor Larissa Mies Bombardi**

Data source: MAPA (2016)

Mapping software: Philcarto I Mapping base: IBGE

Mapping: Eduardo Penha

Support: CAPES / FAPESP

CAPES FAPESP

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“What this remarkable piece of work, a work of courage, from Larissa Mies Bombardi allows us to do, however, is put a finger on an often intangible, hidden, often elusive truth. That which is not well and that seeps into our air, our streams, our soil, our homes, our veins can be named. [...]

Larissa’s work is, therefore, not merely a Brazilian concern. Just as Brazil’s history and transatlantic trade cannot be disassociated from early European industrialisation and early days of empire, its massive role in international food and agroenergy trade mean that the moral, ethical and political questions raised by her research are a global concern. The seepage from laboratory to crop, field to factory and back on to the plates of our families makes the evidence more difficult to ignore. The extent that decision makers may attempt to do so remains to be seen, but the Atlas of Agrotoxins means that the excuse that ‘we did not know’ collapses under the weight of this book.”

Brian Garvey
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