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Rafaela Helena Ludwinsky

Interações etnoecológicas entre imigrantes poloneses e a Mata Atlântica do Planalto Norte Catarinense

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Rafaela Helena Ludwinsky

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O presente trabalho em nível de doutorado foi avaliado e aprovado por banca examinadora composta pelos seguintes membros:

Profa. Dra. Bozena Karolina Bielenin-Lenczowska
Uniwersytet Warszawski

Profa. Dra. Karine Louise dos Santos
Universidade Federal de Santa Catarina

Profa. Dra. Michele de Sá Dechoum
Universidade Federal de Santa Catarina

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Prof. Dr. Nei Kavaguichi Leite
Coordenador do Programa

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Profa. Natalia Hanazaki, Dra.
Orientadora

Florianópolis, 2021.

Aos meus pais, meu querido Ismael e aos antepassados que me acompanharam nesta jornada

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“[...] research is the immersion of the unknown. We just don’t know what we’re doing. We can’t be sure whether we’re asking the right question or doing the right experiment until we get the answer or the result. [...] One of the beautiful things about science is that it allows us to bumble along, getting it wrong time after time, and feel perfectly fine as long as we learn something each time".

Martin A. Schwartz, ‘The importance of stupidity in scientific research’ (2008).

RESUMO

De maneira a abordar diferentes aspectos etnoecológicos na temática das migrações humanas, a presente tese foi delineada permeando características sociais, organizacionais, conhecimento sobre recursos vegetais e de composição vegetal em quintais urbanos. Imigrar faz parte do comportamento humano no qual nos reinventamos e aprendemos sobre diferentes modos de pensar, diferentes realidades econômicas e biológicas. Ao longo do processo imigratório é esperado que exista uma diferença de saberes entre as gerações, a partir daquela geração que vivenciou o deslocamento migratório, bem como uma possível diferenciação em marcadores culturais como a alimentação, reflexo também de novas interações construídas com a biodiversidade. Ainda, o contexto socioeconômico no qual muitos descendentes de imigrantes se deparam no novo local pode ter colaborado para o aprendizado de espécies de plantas nativas, como por exemplo o contexto da exploração de erva-mate e de recursos madeireiros no sul do Brasil. Nosso objetivo foi o de descrever como o Conhecimento Ecológico Tradicional (CET) sobre plantas se distribui entre os descendentes de imigrantes poloneses do Planalto Norte de Santa Catarina, e como este conhecimento tem transformado suas paisagens urbanas, também na tentativa de compreender a contribuição do CET para a identidade cultural mediada pelas plantas. Sendo assim, dividimos a pesquisa em três etapas. A primeira etapa avalia os saberes de plantas entre descendentes de poloneses. Para isso, nós entrevistamos 150 descendentes de imigrantes poloneses (de segunda, terceira e quarta geração de descendentes da geração que se deslocou do país de origem) distribuídos entre os municípios de São Bento do Sul, Rio Negrinho e Itaiópolis, no planalto norte catarinense, cujas faixas etárias variaram de 18 até 90 anos de idade. A posteriori, também separamos esses entrevistados em descendentes que participavam ou não em associações culturais. Nesta etapa da pesquisa, descobrimos que a quarta geração de descendentes citou significativamente menos plantas do que a segunda e terceira geração. No entanto, a composição do conhecimento das plantas foi semelhante ao longo das gerações. Além disso, o envolvimento em associações culturais não desempenhou um papel na influência do conhecimento das plantas, no que diz respeito a citar mais ou menos plantas. A abordagem quantitativa permitiu avaliar a tendência da erosão do conhecimento ao longo das gerações. Já a segunda etapa da pesquisa investigou os saberes e preparos de recursos alimentares, na tentativa de entender padrões de conhecimento de plantas mediados pela cultura dos imigrantes. Esta investigação ocorreu no município de São Bento do Sul e, como este município tem uma forte expressão cultural germânica, nós entrevistamos tanto descendentes de poloneses quanto descendentes de alemães para entender as possíveis negociações bioculturais no uso de recursos alimentares associados a memórias étnicas. Nesta etapa, nós descobrimos que os descendentes de poloneses e alemães compartilham a maioria dos recursos citados, enquanto a diferença entre o uso das plantas está nas memórias étnicas e no preparo dos alimentos. Além disso, existe uma tendência de aculturar ingredientes e sabores por ambos os descendentes, usando espécies nativas para recriar pratos. Finalmente, na terceira etapa da pesquisa, nós investigamos a riqueza de elementos arbóreos, arborescentes e palmeiras (nativas e não nativas) em duas áreas urbanas onde há quintais antigos e recentes, no município de Itaiópolis. Esta investigação teve o propósito de entender se as espécies encontradas em quintais antigos e recentes são diferentes, além de tentar entender quanta riqueza é compartilhada com manchas de floresta próximas. Com isso, descobrimos que quintais antigos e quintais recentes se diferenciam em termos de composição de espécies, e que quintais antigos compartilham mais espécies nativas com as florestas do entorno. Sendo o Brasil um país com uma grande diversidade sócio e biocultural, pesquisas voltadas aos saberes étnicos e biológicos colaboram para entender um pouco mais sobre a forma como as pessoas conhecem e manejam a biodiversidade. As três etapas da pesquisa foram fundamentais para compreender mais facetas associadas aos processos imigratórios dos poloneses no planalto norte catarinense, além de contribuir no entendimento sobre o quanto as pessoas modificam e mantém seus saberes sobre plantas, sobre os ambientes, e incrementam as floras locais.

Palavras-chave: Conhecimento viajante. Saberes de plantas ao longo das gerações. Etnobotânica transcultural. Marcador cultural. Imigração polonesa. Ecologia histórica. Ecossistemas urbanos.

ABSTRACT

This thesis addresses different ethnoecological aspects in the theme of human migration. The study design permeates social and organizational characteristics of plant resources and plant composition in urban homegardens. Immigrating is part of human behavior in which we reinvent ourselves and learn about different ways of thinking, different realities of protecting, and biological. Throughout the immigration process, it is expected that there will be a difference of knowledge between the generations (from the generation that experienced the migratory displacement) and a possible differentiation in cultural markers such as food, also reflecting new interactions built with biodiversity. Still, the socioeconomic context in which many descendants of immigrants encounter the new location may have contributed to the growth of species of native plants, such as the context of the exploration of yerba mate and timber resources in southern Brazil. Our objective was to define how the Traditional Ecological Knowledge (TEK) about plants is distributed among the descendants of Polish immigrants from the North Plateau of Santa Catarina and how this knowledge has transformed their urban landscapes, also in an attempt to understand the contribution of the TEK to the cultural identity mediated by plants. Therefore, we divided the research into three stages. In the first stage, we evaluate plant knowledge among Polish descendants. We interviewed 150 descendants of Polish immigrants (second, third and fourth generation descendants of the generation that moved from the country of origin) distributed between the municipalities of São Bento do Sul, Rio Negrinho, and Itaiópolis, on the northern plateau of Santa Catarina, The age groups range from 18 to 90 years old. A posteriori, we also separated these interviewees into descendants who participated or did not participate in cultural associations. At this stage of the research, we found that the fourth generation of descendants cited fewer plants than the second and third generation. However, the composition of plant knowledge has been similar over the generations. In addition, involvement in cultural associations has not played an influential role in plant knowledge when it comes to citing more or fewer plants. The quantitative approach assessed the trend of knowledge erosion over generations. The second research stage investigated the knowledge and preparation of food resources to understand food plant knowledge patterns mediated by immigrants culture. This investigation took place in the municipality of São Bento do Sul. As this municipality has a solid Germanic cultural expression, we interviewed Polish and German descendants to understand the possible biocultural negotiations using resources associated with ethnic memories. In this step, we found that the descendants of Poles and Germans share most of the mentioned resources, while the difference between the use of plants is in ethnic memories and food preparation. In addition, there is a tendency to acculture ingredients and flavors by both descendants, using native species to recreate dishes. Finally, in the third stage of the research, we investigated the richness of arboreal, arborescent, and palm trees (native and non-native) in two urban areas with old and recent homegardens in the municipality of Itaiópolis. Such investigation aimed to investigate if the species found in old and recent homegardens are different and understand how much richness is shared with patches of the nearby forest. With that, we found that old and recent homegardens differ in terms of species composition and that old homegardens share more native species with the surrounding forests. As Brazil is a country with great socio and biocultural diversity, research focused on ethnic and biological knowledge collaborates to understand a little more about how people know and manage biodiversity. The three stages of the research were fundamental to understand more facets associated with the immigration processes of Poles in the northern plateau of Santa Catarina, in addition to contributing to the understanding of how much people modify and maintain their knowledge about plants, about environments, and increase them as local floras.

Keywords: Traveling knowledge. Plant knowledge through generations. Cross-cultural ethnobotany. Cultural marker. Polish immigration. Historical ecology. Urban ecosystems.

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LISTA DE ABREVIATURAS E SIGLAS

APGIV	Grupo de Filogenia de Angiospermas – *Angiosperm Phylogeny Group*.
CEPSH	Comitê de Ética em Pesquisa com Seres Humanos.
CET	Conhecimento Ecológico Tradicional.
DBH	Diameter Breast Height.
EAFM	Escola Agrotécnica Federal de Manaus.
ECOHE	Laboratório de Ecologia Humana e Etnobotânica.
FOD	Floresta Ombrófila Densa.
FOM	Floresta Ombrófila Mista.
IFFSC	Inventário Florístico e Florestal de Santa Catarina.
SISBIO	Sistema de Autorização e Informação em Biodiversidade.
SisGen	Sistema Nacional do Patrimônio Genético e Conhecimento Tradicional Associado.
TCLE	Termo de Consentimento Livre e Esclarecido.
TEK	Traditional Ecological Knowlegde.
UFSC	Universidade Federal de Santa Catarina.

SUMÁRIO

1 INTRODUÇÃO GERAL

"É um negócio perigoso, Frodo, sair pela sua porta.
Você pisa na estrada e, se não se controlar,
não há como saber para onde você pode ser levado."
(J.R.R. Tolkien, O Senhor dos Aneis).

Migrar é inerente à natureza humana, somos movidos pela busca de novas oportunidades, recursos e pela própria curiosidade (MARCELLA; RING, 2003). Uma vez em movimento, o ser humano encontra desafios de aprendizado, tanto sobre fatores sociais e economicos do novo espaço quanto sobre o novo contexto de diversidade biológica. Assim, o estudo do movimento humano é fundamental para entender estas dinâmicas de mudanças nos conhecimentos de um dado grupo, bem como mudanças que podem estar associadas à diversidade biológica com a qual este grupo interage (ALBUQUERQUE et al., 2019).

Devido a esta gama de desafios e aprendizados no processo migracional, diversas áreas de conhecimento estudam a migração humana, tais como a Geografia, História, Antropologia. Embora as hipóteses e teorias clássicas da ecologia não incluirem historicamente a migração humana enquanto um elemento de estudo, podemos abordar interdisciplinarmente estes contextos migratórios através do estudo da diversidade biológica. A diversidade biológica é um termo usado largamente tanto em mídias populares quanto científicas (TOWNSEND et al., 2006). Dependendo do foco de discussão, ela pode ser analisada em diferentes níveis de estudo, tais como: espécie, variação genética e de comunidades e ecossistemas (PRIMACK; RODRIGUES, 2001). Esta diversidade pode ser traduzida como a diversidade de recursos biológicos (animais e plantas) conhecidos e usados e analisada enquanto riqueza de espécies e abundância relativa, considerando variações espaciais e temporais (HUBBELL, 2001).

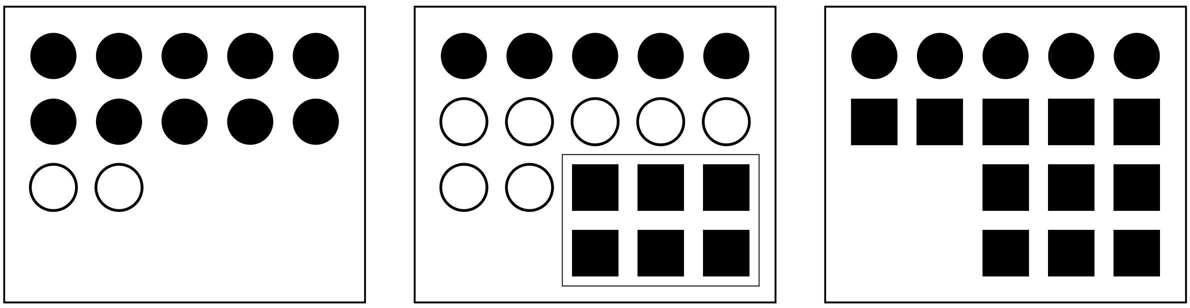
Investigar a diversidade biológica auxilia na compreensão de padrões de distribuição, abundância e interação de espécies (LEIBOLD et al., 2004). A distribuição das espécies está baseada em adaptações e interações, e processos como sucessão e enriquecimento (MAGURRAN, 2013); e um importante fator de modificação de floras é o próprio ser humano. A interação humana no ambiente acaba gerando alterações na diversidade que podem tanto ser visualizadas na paisagem, quanto estar refletidos no Conhecimento Ecológico Tradicional (CET) (ALBUQUERQUE, 2005).

O CET é um corpo de conhecimentos resultado de interações culturais, sociais e ecológicas que se transformam com o tempo e que são transmitidos ao longo das gerações (BERKES, 1999; BERKES et al., 2000). O CET é uma ótima ferramenta para analisar percepção, uso e manejo de diversidade biológica em relação aos recursos do habitat. Tal abordagem é bastante conhecida nas etnociências, em especial na etnoecologia, cujo referencial teórico permite cruzar saberes (e.g.: Ecologia de comunidades, Ecologia de paisagens, Antropologia e Sociologia) e vivências de grupos humanos (e.g.: saberes tradicionais e locais, contextos de imigração e identitades étnicas) (MARQUES, 2001; HUNN, 2007). Assim, a abordagem etnoecológica permite investigar as interações entre pessoas e ambientes em escalas temporais, regionais, culturais e sob o contexto biológico, de maneira a compreender as transformações passadas e atuais entendendo natureza e cultura de forma dialógica (BALÉE, 1998, 2006).

As vivências e transformações no contexto migracional favorecem um espaço de investigação sobre os processos subjacentes às possíveis transformações de comunidades biológicas ao longo do tempo. As características culturais, sociais e históricas de imigrantes refletem a manutenção, incorporação, organização e distribuição das pessoas e plantas no espaço (ALBUQUERQUE et al., 2019). Sendo assim, os contextos de migração nos permitem olhar para o ambiente através de diferentes abordagens. Nesta Tese, utilizamos abordagens da etnoecologia de plantas e paisagem.

Sobre a primeira abordagem, da etnoecologia de plantas, diferentes autores buscam elucidar fatores que podem afetar o padrão de conhecimento e uso de plantas, tais como: Ladio e Lozada (2004), Franco e Narasimhan (2009) e Medeiros et al. (2012). Há diversos caminhos para estudar tais padrões e usos de plantas. Por exemplo, as análises quantitativas de conhecimento de plantas buscam entender se após um evento de migração o conhecimento sobre plantas aumenta, diminui ou mantem-se o mesmo. Medeiros et al. (2018) desenvolveram um *framework* hipotético (Figura 1) que mostra três momentos de transformação do conhecimento: a) conhecimento antes da migração, b) conhecimento após a migração, e c) o que se espera para as futuras gerações.

Figura 1 – Os círculos representam o conhecimento vindo com o imigrante e os retângulos representam o conhecimento adquirido pós imigração. Os círculos de cor preta representam o conhecimento em uso, os círculos brancos representam o conhecimento de estoque (aquele conhecimento que não está em prática, mas que pode ser resgatado da memória).



(a) (b) (c)

Fonte: Adaptado de Medeiros et al. (2018).

Porém, o *framework* por si só não explica as relações complexas de interação entre pessoas e plantas ao longo do tempo. Para expandir esse *framework* analítico, abordagens quantitativas necessitam somar junto às aborgadens qualitativas. Abordagens qualitativas são fundamentais para entender questões de identidade étnica associada aos recursos vegetais.

A relação entre identidade étnica e recursos vegetais é um ponto chave em investigações de povos migrantes e seus descendentes (PARASECOLI, 2014; FONTEFRANCESCO et al., 2019). É comum encontrarmos na literatura a palavra "marcadores bioculturais" (ANDERSON, 2005). Tais marcadores expressam processos adaptativos, econômicos, sociais e de mudanças ecológicas mediadas por povos migrantes (ANDERSON, 2005; PIERONI; VANDEBROEK, 2007; ANDEL; WESTERS, 2010). Plantas alimentícias são ótimos marcadores bioculturais, pois além de considerarem os processos mencionados elas associam memórias identitárias (HOLTZMAN, 2006; HAPPEL, 2012). O ato de comer é uma atividade social que depende da disponibilidade do recurso alimentar (ecológico ou econômico), das negociações bioculturais (PIERONI; VANDEBROEK, 2007) de ingredientes e sabores, e em memórias alimentares que sejam identitárias para uma etnia (LUPTON, 1994). O termo negociação biocultural se refere às decisões constantes, das escolhas e estratégias em incorporar ou resistir ao que faz sentido no momento. Em outras palavras, refere-se à adaptação da cultura e dos recursos biológicos no novo local (PIERONI; VANDEBROEK, 2007).

Quanto à segunda abordagem, da etnoecologia através da paisagem, diversos autores tem demonstrado a relevância das áreas manejadas como elementos importantes nas paisagens; Dentre essas áreas manejadas, os quintais desempenham um papel central na manutenção de recursos vegetais (CARNEIRO et al., 2013; PERONI et al., 2016; RAYOL; MIRANDA, 2020). Os quintais são um dos mais antigos sistemas de uso da terra conhecidos e evoluíram ao longo dos séculos de transformações bioculturais (NAIR; KUMAR, 2006; PIERONI; VANDEBROEK, 2007). Nas áreas urbanas, os quintais fazem parte do mosaico da paisagem e são essenciais em termos de promoção da diversidade e segurança alimentar, adaptação às mudanças climáticas, qualidade de vida e também conectividade entre paisagens urbanizadas e áreas florestais remanescentes (MATTSSON et al., 2013; CAPALDI et al., 2014; PERONI et al., 2016; ÁVILA et al., 2017; SHACKLETON et al., 2017). Tais efeitos positivos dos quintais levam em consideração espécies nativas. Por outro lado, quintais também podem representar um risco à biodiversidade através do cultivo de espécies não nativas invasoras, o que reafirma a importância do estudo dos quintais em ambientes urbanos.

No contexto brasileiro, a imigração desempenha um papel fundamental na configuração dos espaços urbanos e na reflexão cultural da gestão dos quintais, especialmente em áreas onde essa imigração ocorreu há quase um século. Essa configuração reflete a venda de terras a imigrantes, a abertura de clareiras na floresta para a construção de assentamentos e a exploração de produtos florestais. No que diz respeito aos quintais, algumas áreas antigas ainda podem apresentar árvores e palmeiras decorrentes do processo de incorporação urbana das áreas de assentamento, marca da paisagem original em ambiente urbano.

Em 2010, mais da metade da população mundial se encontrava em áreas urbanas (55 %) e as projeções para 2050 são de aumentar para 68 % (UNITED NATIONS, 2010). Nesse cenário de crescente urbanização, os quintais têm um papel fundamental na salvaguarda da sociobiodiversidade. Portanto, observar quintais em áreas urbanas e investigar os padrões de elementos arbóreos, arborescentes e palmeiras pode indicar uma preferência por espécies mantidas em quintais e se essas áreas podem ser mais propensas a receber propágulos de espécies nativas de fragmentos florestais próximos.

Tendo em vista os fatos apresentados, a presente tese foi delineada de maneira a abordar diferentes aspectos etnoecológicos na temática das migrações humanas. Os aspectos compreendidos permeiam características sociais, organizacionais, conhecimento sobre recursos vegetais e de composição vegetal em quintais. Tal investigação pode contribuir para o entendendimento, no processo migratório, sobre o quanto que as pessoas modificam e mantém seus saberes, ambientes, e incrementam as floras locais.

1.1 TEMA DE PESQUISA, MOTIVAÇÃO E CONTATO COM OS COLABORADORES

Enquanto recorte étnico e geográfico, escolhemos a imigração polonesa ocorrida no Planalto Norte Catarinense. A escolha dos recortes foram baseadas em literaturas sobre etnoecologia e imigração, e também através de fontes históricas locais. Foram fontes de inspiração as pesquisas do Laboratório de Ecologia Humana e Etnobotânica (ECOHE) com descendentes de grupos como os alemães (MILANESI et al., 2013; PODEROSO et al., 2017), bem como de outros grupos de pesquisa na temática de migrações, tais como Pieroni e Vandebroek (2007), Łuczaj et al. (2012), Pieroni et al. (2012), Vandebroek e Balick (2012), Kujawska e Łuczaj (2015), Kujawska e Pieroni (2015) e Kujawska et al. (2017).

Não obstante, as experiências e observações próprias foram os pilares de tomada de decisões para a concretização do tema de pesquisa. Também sou descendente de poloneses (por parte de meu pai). Desde muito pequena ouvia histórias dos avós, bisavós, tataravós, etc. Ouvia histórias daqueles que teriam vindo em navios e que fugiram da fome. Tive o privilégio de conhecer minha tia bisavó Jadwiga Sollack, que contava suas histórias da juventude: *"[...] na época que a família veio pro Brasil aconteciam muitas propagandas. Diziam que o Brasil era um país tão rico, com tanta fartura de terra e comida, que era possível cercar o próprio terreno, só que no lugar de arames farpados, com linguiça!"*. Ouvia muitas histórias de como as coisas eram difíceis, principalmente com relação a comida. Como era preciso plantar na roça ou no quintal, caçar ou criar bichos para corte, procurar comida no mato e compartilhar com a família.

Motivada a entender melhor as histórias da família, desde cedo comecei a ler materiais sobre migração. Em pouco tempo estava buscando informações em arquivos históricos, tais como listas de navios e registros de compras de lotes por imigrantes. Também comecei a participar na minha cidade natal de uma associação cultural chamada Sociedade Cracóvia, que reunia descendentes de Poloneses e simpatizantes desta cultura. Apenas algum tempo após concluir a graduação que conheci a etnobiologia e percebi a possibilidade de estudar a relação entre pessoas e a natureza.

Toda a rede de contatos com descendentes, de investigação em arquivos históricos, conversas com informantes chaves, atuação em associação cultural e o tempo de aprendizado no ECOHE, colaboraram profundamente quando decidi pelo tema de pesquisa e coleta de dados. O contato com as associações culturais foi sempre muito tranquilo, as entrevistas eram momentos preciosíssimos nos quais me sentia muito "em casa". O fato de também ser descendente de poloneses me fazia mais próxima dos colaboradores das entrevistas. Quando eles ouviam meu sobrenome, alguns tentavam falar em polonês comigo, outros me ofereciam um café e a conversa ia longe (Figura 2).

Figura 2 – (a) Na foto, colaboradora mostra um pequeno álbum de memórias de viagem na sua primeira viagem para o exterior. Nesta ocasião, visitou a Polônia, entre outros países, para regatar a história da imigração da própria família. Nota-se que algumas plantas foram trazidas e mantidas secas como memória *"[...] minha mãe e avó tinham várias plantinhas no quintal, trouxe algumas que me fazem lembrar da Polônia e da minha infância"*. Foto registrada em Rio Negrinho. (b) Rio Natal é uma localidade do interior e, também, considerada uma das "mais polonesas" em São Bento do Sul. Neste dia a entrevista foi extensa, coletei plantas, recebi indicações de moradores para entrevistar, aprendi muitas coisas sobre a região e conheci muitas pessoas queridas e solícitas em colaborar na pesquisa.

(a) (b)

Fonte: Ludwinsky, R.H., 2017(a) e 2018(b).

1.2 OBJETIVO GERAL

Descrever como o conhecimento ecológico tradicional sobre plantas se distribui entre os descendentes de imigrantes poloneses do Planalto Norte de Santa Catarina e como este conhecimento tem transformado suas paisagens urbanas, também na tentativa de compreender a sua contribuição para a identidade cultural mediada pelas plantas.

1.2.1 Objetivos Específicos

- Documentar as plantas conhecidas entre as gerações de descendentes poloneses;
- Registrar a origem e o uso das plantas na culinária típica local;
- Discutir sobre o conhecimento e uso de plantas, enquanto ingredientes e culinária típica conhecidas e mediadas pela cultura polonesa e alemã;
- Documentar a origem e os tipos de usos das plantas;
- Avaliar se o conhecimento local sobre plantas varia conforme a geração do descendente de imigrante;
- Avaliar se o conhecimento local sobre plantas é influenciado pelas participação em associações culturais relacionadas à identidade de imigração;

- Documentar a riqueza e abundância relativa de espécies arbóreas, arborescentes e palmeiras em quintais recentes e quintais antigos de uma área urbana;
- Comparar a similaridade de espécies entre quintais recentes, quintais antigos e da mata do entorno;
- Discutir sobre a importância de estudos voltados à migração humana e o quanto o CET e o ambiente atuam moldando a biodiversidade e vice-versa.

1.3 CONTRIBUIÇÕES DA TESE

As contribuições desta tese estão apresentadas em três artigos. O Artigo 1 – "People and plants through generations of Polish descendants in Brazil" foi publicado na revista *Economic Botany* e aborda quantitativamente as transformações do CET associado a plantas ao longo das gerações. O Artigo 2 – ""If there's no dill, the taste isn't right"! A comparison of food plant knowledge between Polish and German descendants in the context of an imagined culinary community in Brazil. " foi publicado na revista *Ethnic Foods* e traz ferramentas ecológicas para análisar plantas alimenticias enquanto marcadores bioculturais. Finalmente o Artigo 3 – "Over 100 years of immigration in Brazil: Can we see cultural features in homegardens?" investiga a riqueza de elementos arbóreos presentes em ecossitemas urbanos e discute nicho cultural em áreas intensamente manejadas como os quintais.

2 MATERIAIS E MÉTODOS

2.1 ÁREA DE ESTUDO

2.1.1 Breve histórico da imigração Polonesa em Santa Catarina

No Brasil, o Século XIX foi marcado pela chegada de milhares de imigrantes europeus, cujas motivações da imigração permearam momentos característicos. Historicamente, o império (segundo reinado 1840 - 1889) via o Sul do Brasil como uma "terra vazia", negligenciando os povos indígenas e caboclos que já habitavam a região (FICKER, 1973). De um lado, o cenário econômico europeu passava por mudanças que desfavoreceram principalmente a mão-de-obra camponesa. De outro lado, o cenário brasileiro fomentava ações voltadas para a atração de imigrantes, com o propósito de criar uma classe trabalhadora qualificada, não escrava e branca (SANTOS, 2002; BENTHIEN, 2005; RODYCZ, 2011).

Assim surgia um período de ondas imigratórias mediadas por sociedades colonizadoras, estas ondas datam de 1869-1890, 1890-1894 [1] e 1895-1914. A Segunda Guerra Mundial também é a causa de um forte período de imigrações, porém não mediados por sociedades colonizadoras mas por necessidade de sobrevivência (BENTHIEN, 2005). Desta forma, várias etnias imigraram para o Brasil, tais como alemães, italianos, ucranianos, poloneses, entre outras, sendo que a maioria destes imigrantes eram agricultores (DVORAK, 2013). Das causas da imigração polonesa podemos citar alguns contextos no país de origem, como por exemplo: a má distribuição de terras, falta de empregos, crises decorrentes de guerras e epidemias (RODYCZ, 2011). Tais imigrantes chegaram de diversas localidades, por exemplo, para o planalto norte catarinense há registros de imigrantes poloneses vindos da província Galiana e Bukóvia, ambas pertencentes ao antigo Império Austro-Húngaro (1864-1918) (FICKER, 1973; ALESC, 2009).

Com a chegada dos imigrantes poloneses, foram distribuídos lotes para formação das colônias, em sua maioria na região sul do país, distribuindo-se nos estados do Paraná, Rio Grande do Sul e Santa Catarina, respectivamente (FICKER, 1973; RODYCZ, 2011). Em Santa Catarina, os maiores adensamentos de imigrantes poloneses ficaram estabelecidos na região do planalto norte, destacando-se a colônia Lucena (atual Itaiópolis) e colônia Rio Vermelho em São Bento do Sul (IAROCHINSKI, 2009). No final do Século XX, a comunidade étnica polonesa no Brasil contava cerca de 1 milhão e meio de pessoas, o que faz com que – depois dos Estados Unidos – o Brasil possua a segunda maior comunidade oriunda de imigrantes poloneses (MALCZEWSKI, 2000).

Ainda, a maioria destes imigrantes poloneses na verdade vieram do Império Austro-Húngaro, de uma região chamada Galícia que atualmente corresponde o Sul da Polônia e Oeste da Ucrânia (1864-1918) (FICKER, 1973). Isso porque dadas as históricas guerras e partilhas de território o país Polônia deixou de existir por 123 anos, voltando a existir apenas em 1918.

[1] Também reconhecido como o período da "febre brasileira" devido a grande massa de imigrantes que adentrava o país

No entanto, mesmo com as partilhas e com imigrações a noção de uma identidade polonesa permaneceu. No Brasil, esta identidade é muito bem representada pelo escritor Paulo Leminski através das suas obras que evocam memórias ligadas aos antepassados imigrantes, principalmente através do poema "o meu coração de polaco voltou":

> *"Meu coração de polaco voltou; coração que meu avô;*
> *trouxe de longe pra mim; um coração esmagado; um coração*
> *pisoteado; um coração de poeta."*
> (Paulo Leminski)

Para a seleção dos municípios integrantes do projeto, levou-se em consideração dois critérios: a) Polo de concentração da imigração polonesa em Santa Catarina; b) Histórico de busca e manutenção das tradições. Desta forma, a tese foi desenvolvida em três municípios de Santa Catarina, sendo estes Itaiópolis, São Bento do Sul (já mencionados) e Rio Negrinho, apresentados na Figura 3.

Figura 3 – Municípios onde foram realizadas as coletas de dados.

Fonte: Ludwinsky, R.H. e Cruz, A.P., 2019.

Rio Negrinho foi incluído na amostragem uma vez que pertencia a São Bento do Sul na época da imigração e também por estar na posição intermediária entre os municípios de Itaiópolis e São Bento do Sul, além de ter uma importância na história econômica da região.

2.1.2 Características socioambientais

O recorte geográfico deste estudo pertence ao domínio da Mata Atlântica. A Floresta Ombrófila Mista (FOM) pertence ao domínio da Mata Atlântica (GEOGRAFIA E ESTATÍSTICA – IBGE, 2019), *hotspot* de biodiversidade (MYERS et al., 2000). A FOM, também conhecida como floresta com Araucária ou com Pinhais, cobre grande parte do planalto catarinense e apresenta a maior riqueza de espécies madeireiras, comparativamente as outras regiões fitogeográficas da Mata Atlântica (KLEIN; REITZ, 1978). No entanto, o Inventário Florístico e Florestal de Santa Catarina (IFFSC) (GASPER et al., 2013) constatou uma diminuição de 39 espécies arbóreas citadas para a FOM em relação aos estudos de Reitz et al. (1979). Tal mudança na composição de espécies vegetais é esperada, uma vez que o planalto norte apresenta processos de colonização que marcaram a história de Santa Catarina, desde a chegada dos imigrantes até a exploração de madeira (TRES et al., 2011).

Neste cenário de manejo histórico e transformações da paisagem na FOM, se situam: os cultivos agrícolas, a colheita da erva-mate, exploração madeireira através da construção da estrada de ferro[2] e exploração pelas empresas moveleiras da região (KORMANN, 1980; TRES et al., 2011). As cidades de Itaiópolis e Rio Negrinho estão integralmente inseridas na FOM, enquanto que São Bento do Sul encontra-se em uma região de transição. Em São Bento do Sul, há ocorrência da FOM no planalto e na Serra do Mar há ocorrência da Floresta Ombrófila Densa (FOD), dominante nos vales dos rios Natal e Humboldt (SANTA CATARINA, 1986).

Itaiópolis é reconhecida por ter sido uma das maiores colônias de imigrantes poloneses de Santa Catarina. A antiga colônia Lucena, como era chamada, não possui registro oficial de criação, mas deduz-se que tenha sido por volta do ano de 1891 e recebeu principalmente imigrantes poloneses vindos da colônia de Rio Negro – Paraná (RODYCZ, 2011). Em 2010, a cidade de Itaiópolis possuia cerca de 21.263 habitantes, dos quais estima-se que 10.000 são descendentes de poloneses (IBGE, 2010a).

No município de São Bento do Sul, o marco da imigração foi em 20 de setembro de 1873, quando a Colônia Dona Francisca enviou os primeiros 70 colonos para a colônia de Rio Vermelho. Tais imigrantes eram compostos por diferentes etnias, tais como: austro-bávaros, pomeranos, boêmios do Norte e poloneses (FICKER, 1973). Segundo Kaszubowski (2015), dos 80.936 habitantes (IBGE, 2010b), estima-se que 25.000 sejam descendentes de poloneses. Já Rio Negrinho, veio a ser um município autônomo apenas no ano de 1979. Antes disto, o município pertencia a cidade de São Bento do Sul. O povoamento de Rio Negrinho se deu através de eventos tais como: a construção da estrada Dona Francisca, a construção da estrada de ferro e, posteriormente, através da extinta fábrica de Móveis Cimo (KORMANN, 1980).

Os municípios se destacam pelos movimentos culturais dos descendentes da etnia po-

[2] A *Southern Brazil Lumber and Colonization Company* ou simplesmente *Lumber*, foi uma das companhias internacionais instaladas com a autorização do governo Brasileiro. Seu objetivo era a construção da estrada de ferro que ligaria o Rio Grande do Sul a São Paulo. A empresa também explorou madeiras para os assentamentos dos trilhos e para exportação (TRES et al., 2011).

lonesa através de sociedades ou associações culturais que mantêm regularmente atividades culturais voltadas para a tradição polonesa, tais como: aulas de idioma, dança (folclore), teatro, música, entre outros.

2.2 DELIMITAÇÃO DA PESQUISA E ASPECTOS ÉTICOS

Nos três artigos que compõem esta tese, o CET e memórias da imigração foram acessados através de entrevistas com o auxílio de um questionário semiestruturado, apresentados no Apêndice A. Os métodos adotados estão descritos em cada artigo, mas adicionalmente alguns detalhamentos sobre a delimitação da pesquisa estão expostos a seguir.

Antes do início das entrevistas, nos aproximamos das associações culturais de cada município de coleta. Os encontros com as associações nos permitiram conhecer melhor os objetivos e os trabalhos desenvolvidos em prol da cultura local (Figura 4). Além disso, o contato com as associações nos permitiu identificar possíveis informantes chaves com os quais realizaríamos as entrevistas. Iniciamos o contato com as associações em julho de 2016 e no final do mesmo ano testamos um protocolo piloto de entrevistas.

Para registrar o conhecimento sobre plantas a técnica aplicada na entrevista foi a listagem livre. Já para a coleta das plantas utilizamos turnês guiadas com os colaboradores da pesquisa que se mostraram disponíveis. A técnica da turnê guiada consiste em deixar que o colaborador mostre o local aonde obtém determinada planta citada na entrevista (ALEXIADES, 1996; ALBUQUERQUE; LUCENA, 2004). As plantas coletadas foram herborizadas conforme metodologia padrão (ALBUQUERQUE; LUCENA, 2004) e depositadas no herbário da Escola Agrotécnica Federal de Manaus (EAFM). Angiospermas foram identificadas a partir da quarta versão do sistema de classificação do Grupo de Filogenia de Angiospermas – *Angiosperm Phylogeny Group* (APGIV) e os demais grupos foram identificados através de bibliografias específicas. Plantas cuja identificação botânica não suscitaram dúvidas, não foram coletadas. Exemplo: Couve (*Brassica oleracea* L.), Feijão (*Phaseolus vulgaris* L.), Maçã (*Malus communis* Desf.). Ainda assim, para as plantas que não tiveram coleta de material biológico a identificação ocorreu através de fotos das espécies com consultas aos especialistas do herbário FLOR da Universidade Federal de Santa Catarina (UFSC) e de comparação com trabalhos realizados na área de estudo.

Foram utilizadas as bases de dados The Plant List (THE PLANT LIST, 2013) e REFLORA (REFLORA, 2015) para conferir os nomes das plantas identificadas. Foram consideradas espécies nativas as que possuem origem no Brasil, utilizando principalmente como base de dados de conferência as informações do REFLORA (REFLORA, 2015). Ainda, plantas que não puderam ser identificadas ou que tiveram sua identificação em nível de família ou de gênero não foram inclusas na análise da origem.

Para efetuar a amostragem das entrevistas, no artigo “ People and plants through generations of Polish descendants in Brazil”, consideramos um recorte temporal de imigração de 1890 – 1900. Isso nos permitiu entrevistar três gerações de descendentes. Consideramos o imigrante como geração 0 e as gerações seguintes 1ª, 2ª, 3ª e 4ª geração. Na nossa amostragem não incluímos pessoas de 1ª geração[3], uma vez que, devido o recorte temporal, tais descendentes já haviam falecido. Além da definição das gerações amostradas, a amostragem estava condicionada a participantes maiores de 18 anos, que residissem nos municipios amostrados a pelo menos 10 anos e que consentissem a participar da pesquisa. Ainda, adicionamos uma variável de carater sócio-organizacional para estratificar os grupos de geração incluindo pessoas que participam ou participaram de associações culturais e grupos de pessoas que nunca participaram destas associações.

A população alvo da amostragem está espalhada geograficamente nos municípios estudados e, adicionalmente, o estudo considerou condições específicas de coleta (geração, tempo de residencia, etc.). Para tanto, elaboramos uma abordagem amostral híbrida, com elementos probabilísticos e não-probabilísticos. Iniciamos a coleta de dados com a metodologia bola de neve (não-probabilístico) (BERNARD; RYAN, 2010) com um colaborador-chave de uma associação cultural. A partir desta entrevista, coletamos até cinco nomes para compor as próximas entradas da bola de neve. Alguns colaboradores não quiseram informar nomes e respeitamos este posicionamento. No momento que a metodologia bola de neve passava a repetir nomes (ao menos 3 repetições de sugestão para entrevistas) nós fazíamos uma pausa e iniciavamos a segunda metodologia de amostragem.

A segunda metodologia consiste em análise de probabilidade de encontrar descendentes de poloneses na localidade estudada. Para isso, nos baseamos em dados de arquivos históricos e investigamos as localidades que originalmente mais receberam imigrantes poloneses. Encontradas as localidades, fizemos uma amostragem sistemática (probabilística) (BARBETTA, 2017) na qual listamos os bairros, enumeramos as ruas e sorteamos até 3 locais de coleta. Uma vez sorteados, visitamos os locais e realizamos a abordagem porta-a-porta. Sempre que possível, solicitávamos nomes de colaboradores-chaves para dar sequência a nova bola de neve e assim dar continuidade à amostragem. Com esta metodologia híbrida, nos esforçamos em atingir sempre o mesmo número de entrevistas para os grupos geracionais, bem como para pessoas participantes ou não de associações culturais.

No artigo “If there’s no dill, the taste isn’t right! A comparison of food plant knowledge between Polish and German descendants in the context of an imagined culinary community in Brazil”, usamos métodos de coleta similares aos descritos para o artigo “People and plants through generations of Polish descendants in Brazil”. Este artigo contou também com dados coletados em uma iniciação científica associada a este doutorado e realizada no ECOHE (CAVALHIERI, 2018). Como a coleta de dados com descendentes de poloneses já havia sido realizada em São Bento do Sul, Cavalhieri (2018) coletou dados de outra etnia de descendentes, na mesma área, para fins comparativos. Logo, esta coleta usou os mesmos protocolos de entrevista e os mesmos métodos de amostragem. A principal diferença da amostragem usada por Cavalhieri (2018) foi de não restringir as gerações em números de entrevistas iguais, bem

[3] Encontramos alguns descendentes de 1ª geração nas áreas de estudo, porém estes vieram após a segunda guerra mundial. Portanto estes descendentes se encontravam fora dos limites da pesquisa.

como os estratos das associações culturais.

Figura 4 – Presidente da associação cultural Sociedade Varsóvia em São Bento do Sul.

Fonte: Ludwinsky, R.H., 2016.

Esta pesquisa foi aprovada pelo Comitê de Ética em Pesquisa com Seres Humanos (CEPSH) da UFSC (protocolo número 58283316.0.0000.0121), e a participação dos colaboradores foi condicionada à aceitação do Termo de Consentimento Livre e Esclarecido (TCLE) (Apêndice B). No caso de colaboradores muito idosos ou com dificuldades para ler ou escrever, solicitamos a presença de um filho(a) ou alguém da família para acompanhar a leitura do termo de consentimento. A pesquisa também foi aprovada pelo Sistema de Autorização e Informação em Biodiversidade (SISBIO) (protocolo número 63758) e cadastrada no Sistema Nacional do Patrimônio Genético e Conhecimento Tradicional Associado (SisGen) (protocolo A8129ED).

3 ARTIGO 1 – PEOPLE AND PLANTS THROUGH GENERATIONS OF POLISH DESCENDANTS IN BRAZIL

Pessoas e plantas através das gerações de descendentes de poloneses no Brasil

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Figure 5 – Museu municipal Carlos Lampe em Rio Negrinho, SC. Sociedade cultural Cracóvia organizando exposição sobre conexões Brasil-Polônia, em prol da memória entre as gerações dos descendentes do município.

Fonte: Acervo Sociedade Cracóvia, 2014.

People and plants through generations of Polish descendants in Brazil

R. H. LUDWINSKY[1,2], N. PERONI[1], AND N. HANAZAKI[1]

[1]Department of Ecology and Zoology, Laboratory of Human Ecology and Ethnobotany, Federal University of Santa Catarina, Florianópolis, Brazil
[2]Department of Ecology and Zoology, Ecology Post-graduate Program, Federal University of Santa Catarina, Florianópolis, Brazil

ABSTRACT

Exploring the dynamics of knowledge through generations of immigrants and their descendants can elucidate different variables that contribute to the transformation of traditional ecological knowledge. In this study, we present a quantitative investigation of intergenerational plant knowledge among Polish descendants in Brazil. We seek to answer the following questions: 1) Would plant knowledge vary with age? 2) Does the composition of species vary in accordance with the descendant's generation? 3) Does the strengthening of identity act as a homogenizer of plant knowledge? We interviewed 150 Brazilian descendants of Polish immigrants from three generational groups (second, third, and fourth generations). We classified them into two groups based on their participation in cultural associations. We found that the fourth generational group cited significantly fewer plants than the second and third groups. However, the composition of plant knowledge was similar throughout the generations. The involvement in cultural associations did not play a role in homogenizing plant knowledge. We discuss and reflect on the differences in knowledge between generations and groups that do and do not participate in cultural organizations.

Keywords: Traveling knowledge; Migrant ethnobotany; Diaspora; Dynamics of plant knowledge.

3.1 INTRODUCTION

Migration is a part of human nature due to the impulse of seeking new opportunities and a better quality of life (MARCELLA; RING, 2003). However, when arriving in a place with a novel biological context, migration challenges people to learn about local diversity from scratch. The changes in plant knowledge among migrants make the study of human movements fundamental to understanding the dynamics of plant knowledge (CEUTERICK et al., 2008; ALBUQUERQUE et al., 2019).

In the last decade, studies on migrants and ethnobotany have raised questions, including: What changes occur in the repertoire of traditional plant knowledge? How do people adapt their knowledge and practices to a new flora? Can knowledge decrease and eventually be lost in the migration process? (CEUTERICK et al., 2008; PALANISAMY et al., 2011; VANDE-

BROEK; BALICK, 2012; ASWANI et al., 2018). Examining the dynamics in this knowledge across generations of descendants is critical to understanding the biocultural dynamics of migrants through time. Studies on intergenerational patterns have tended to ask the following questions: How is biocultural knowledge acquired, and how does plant knowledge change and become lost across generations? (BUSSMANN et al., 2018; KUJAWSKA et al., 2017; MEDEIROS et al., 2012; PASQUINI et al., 2018). The expected quantitative results of these inquiries may be that immigrants' knowledge increases as they add knowledge of local flora to their own prior knowledge. Meanwhile, future generations are expected to lose the knowledge that the immigrant no longer uses and tend towards more significant acquisition of knowledge of the local flora (MEDEIROS et al., 2012).

Research with descendants that share the same ancestral country is challenging due to the differences in generational timelines, influenced by social, economic, and cultural factors (MATHEZ-STIEFEL; VANDEBROEK., 2012). The influences of a timeline can provide exciting insights into the collective dynamics of knowledge (BROWN, 2011). Exploring dynamics through generations of immigrant communities can help to expand our views about the different variables that contribute to the transformation of knowledge. Age and generation are correlated variables that provide critical insights into data on plant knowledge (AYANTUNDE et al., 2008; MÜLLER et al., 2014; SOUSA et al., 2012). Members of different generations may know different plants due to the distinct way each person accesses resources (HANAZAKI, 2003). The reinforcement of shared identity through plants is another important variable that can help communities in the process of self-recognition of culture (DUNN, 2013; VETETO; WELCH, 2013). However, it can also lead migrant groups to recognize and accept a limited number of characteristics as forming a part of their identity. Thus, identity reinforcement could act as a homogenizer of plant knowledge.

Brazil has been populated by several waves of non Amerindian immigrants arriving in the last five centuries. A strong wave of immigrants came from Europe between the late 19th and early 20th centuries, and these migratory movements resulted in changes and adaptations in food habits, medicines, and livelihoods as a whole. For example, Uhle and Grivetti (1993) discussed how food patterns changed and adapted from Switzerland to Brazil after a century of isolation. The transformations of traditional knowledge of European Tyrolese migrants in Southern Brazil was studied for medicinal plants (HASELMAIR et al., 2014; PIRKER et al., 2012) and food plants (KUHN et al., 2018) known and used. As a way to keep rooted to their original countries, in several places these European identities are partially reinforced by cultural associations, which organize cultural activities and meetings of local populations. The distance from homeland often leads people to recreate traditional practices as a form of cultural reinforcement (BROWN, 2011). Nevertheless, the willingness to learn from culturally different individuals, and the reinforcement of a cultural identity (cultural conservatism), can play an important role not only in social but in a biological domain (ERTEN et al., 2018; GECK et al., 2016).

The ethnobotany of Polish migrants in South America was studied in Argentina (KU-

JAWSKA et al., 2017; KUJAWSKA; ŁUCZAJ, 2015; KUJAWSKA; PIERONI, 2015), focusing on medicinal plant diversity and intercultural interactions between migrants, wild edible plants, and food plants. However, there is no information about such adaptations of Polish migrants in Brazil, which received one of the larger migrant populations of Polish in Latin America (PACYGA, 2005).

We conducted an intergenerational survey to investigate the dynamics of plant knowledge between generations of descendants of Polish immigrants in Southern Brazil. Given that the baseline of immigrants' local plant knowledge was limited when they arrived at the new continent, and that the knowledge and use of plants change rapidly over generations, we had three major questions: 1) Would plant knowledge vary with age? 2) Does the composition of species vary in accordance with the descendant's generation? 3) Does the strengthening of identity act as a homogenizer of plant knowledge? We hypothesized that, over generations, the elderly would report, on average, more plants than the younger descendants, due to the process of accumulation of knowledge. Intergenerational knowledge of plants may reflect cultural transmission and adaptation over time. Therefore, we hypothesized that a significant overlap in the composition of species cited among different generations should exist due to their common cultural heritage. Our final hypothesis stated that descendants involved in cultural associations would report fewer plants than those who are not involved in such associations, as a result of a cultural conservatism due to cultural reinforcement.

3.2 MATERIALS AND METHODS

3.2.1 Study Area: Historical and Contemporary Aspects

We conducted surveys in São Bento do Sul, Rio Negrinho, and Itaiópolis, which are three municipalities of the northern plateau of Santa Catarina State, southern Brazil (Figure 6). All of them consist mostly of rural and semi-urbanized areas. The region is also home to the largest settlements of Polish immigrants, as well as efforts and organizations dedicated to the maintenance of cultural traditions (IAROCHINSKI, 2009).

In the study area, Polish immigration dated from 1869–1890, 1890–1894 (periods known as the "Brazilian Fever"), and 1895–1914 (PIETRASZEK, 1974). Most of the immigrants were from the province of Galicia, which was the northeastern province of the former Austro-Hungarian Empire (1864–1918) (FICKER, 1973; PACYGA, 2005). While Polish immigration to Brazil also occurred during the Second World War, there was no significant influx of immigrants to the study region during this period (RODYCZ, 2011).

For our sample, we considered a time frame of immigration from 1890 to 1900. This allowed us to interview three generations of descendants. Historically, the Brazilian imperial government recognized the south of the country as an empty land, neglecting the indigenous peoples and mestizos that were already inhabiting the region (FICKER, 1973). Under Emperor Pedro II (1840–1889), the government enacted measures aimed at attracting immigrants

Figure 6 – Study site and municipalities where interviews were conducted.

Ludwinsky, R.H. and Cruz A.P., 2019.

to exploit natural resources, such as wood and yerba mate, and to create a white, non slave working class (RODYCZ, 2011). These actions attracted several ethnic groups who immigrated to Brazil, such as Germans, Italians, Poles, Ukrainians, and others. In Brazil, Polish immigrants arrived at previously established German settlements, and due to the history of fights and partitioning of Poland, contributed to Polish immigrants concentrating their settlements in regions more distant to the other ethnic groups.

3.2.2 Study Design and Data Sampling

We selected collaborators interviewed through snowball sampling with the following criteria: (a)age 18 years or older; (b) second- to fourthgeneration Polish descendant; (c) residing in the area for at least 10 years; (d) agreed to participate in this research. We conducted interviews with respondents between January 2017 and March 2018. The sample consisted of 150 Brazilians of Polish descent, with 50 interviewees per generation. In addition, we divided the 150 respondents into two groups, one with descendants who are members of or participate in cultural associations, and the other with those who do not participate in such associations (Table 1). Cultural associations are organizations that unite people through their connection to Polish culture. These groups commonly feature language classes, traditional cooking classes, and traditional dances. Annual festivities are also common, in which the whole community is invited to celebrate the Polish culture. The semi-structured interviews collected information on socio-organizational variables such as age, generation (correlated variables), gender, and participation in cultural associations.

Data on plant knowledge were collected through free lists, where we gathered information about the known plants and the purposes of uses for each plant. We asked about the main uses of each plant species, including major use categories based on (VETETO; WELCH, 2012) such as human food, medicinal, and cultural uses. We collected and photographed the cited plants during walk-in-the-woods touring (ALEXIADES, 1996) in home gardens, pastures, and forests. The plants were identified through the bibliography and reviewed by plant taxonomists at the Federal University of Santa Catarina, Florianópolis, Brazil. Vouchers were deposited at the EAFM herbarium, Federal Institute of Education, Science, and Technology of Amazonas, Manaus, Brazil under the numbers 17,511–17,526. We photographed plants to check the identification of common species, identified in the field, and to help in the identification of plants with no reproductive structures available.

Table 1 – Study sampling design.

	2nd generation	3rd generation	4th generation	Total
Sampling	50	50	50	150
Subset of the main sampling (not considering generation)				
Involved in cultural associations	75			150
Not involved in cultural associations	75			

3.2.3 Data Analyses

The Spearman correlation was performed to evaluate if plant knowledge would be age-dependent, and the Kruskal-Wallis test was used to compare the averages of plants cited per generational group. Since age and generation were highly correlated (Spearman correlation p value <2.2e-16), for the other analysis we used the variable generation instead of age. Interpolation and extrapolation curves were used to explore the composition of species cited between generations and involvement in cultural associations. To assess if generations of descendants and involvement in cultural associations share common clusters of known plants, we used a non-metric multidimensional scaling (nMDS) analysis with the Jaccard matrix. To compare nMDS differences between groups, we carried out a permutational multivariate analysis of variance (PERMANOVA) and a multivariate homogeneity test of group dispersions (PERMDISP). To test differences in the average number of plants cited by those involved or not in cultural associations, we used the MannWhitney-Wilcoxon test. We performed all analyses in R (R DEVELOPMENT CORE TEAM, 2018) using the ade4 (DRAY; DUFOUR., 2007), vegan (OKSANEN et al., 2018) , ape (PARADIS; SCHLIEP, 2018), and iNEXT (HSIEH et al., 2018) packages.

3.3 RESULTS

We interviewed 83 women and 67 men with ages varying between 18 to 90 years. The average ages were 69 years (σ 11.61) for the second generation, 49 years (σ 13.97) for the third generation, and 29 years (σ 9.65) for the fourth generation. For the groups involved and not involved in cultural associations, the average age was 45 years (σ 20.55) and 53 years (σ 18.73), respectively.

We recorded a total of 443 plant citations, of which 320 were identified to the species level, and 23.93% were mentioned by just one person (idiosyncratic). Asteraceae (30 species), Lamiaceae (17 species), and Myrtaceae (11 species) were the three major families identified, and most of the cited plants are non-native (84.05%). The five mostcited plants per studied group are in Table 2. For all groups, the most cited plants were *Aristolochia cymbifera* Mart. and *Brassica oleracea* L. All groups indicated knowledge of the most cited plants. *Aristolochia cymbifera* was cited for medicinal purposes as a detoxifier of the body, while *B. oleracea* was cited for food and medicinal purposes. The food purpose of *B. oleracea* appeared in several recipes cited, mainly related to Polish cuisine, such as sour cabbage, gołąbki (stuffed cabbage), or pierogi (a type of dumpling) filling.

Table 2 – List of most cited plants. The five plants most frequently cited by each studied group are highlighted in bold.

Botanical family	Species	Origin	2nd generation Freq(%)	3rd generation Freq(%)	4th generation Freq(%)	Involved in cultural associations Freq(%)	Not involved in cultural associations Freq(%)
Aristolochiaceae	*Aristolochia cymbifera* Mart.	Native	**13.97%**	**11.73%**	**15.55%**	**17.06%**	**14%**
Convolvulaceae	*Ipomoea batatas* (L.) Lam.	Native	**12.69%**	7.04%	9.33%	13.47%	11.22%
Brassicaceae	*Brassica oleracea* L.	Non-native	**12.38%**	**9.67%**	**16.44%**	**16.16%**	**12.42%**
Sapindaceae	*Litchi chinensis* Sonn	Non-native	**10.47%**	8.79%	**20.88%**	**17.96%**	**11.28%**
Solanaceae	*Brugmansia suaveolens* (Humb. & Bonpl. ex Willd.) Bercht. & J.Presl	Native	**9.52%**	6.15%	8.44%	11.67%	8.44%
Lamiaceae	*Plectranthus madagascariensis* (Pers.) Benth.	Non-native	6.66%	5.27%	**19.11%**	**14.97%**	8.35%
Solanaceae	*Cyphomandra betacea* (Cav.) Sendtn	Non-native	6.03%	**11.14%**	13.33%	**14.97%**	9.66%
Apiaceae	*Anethum graveolens* L.	Non-native	10.79%	9.09%	14.22%	13.77%	*11.52%*
Lythraceae	*Punica granatum* L.	Non-native	12.69%	**9.97%**	**15.55%**	17.66%	**11.28%**
	Bidens pilosa L.	Native	6.66%	*9.38%*	*16%*	13.77%	11.22%
Cupressaceae	*Cunninghamia lanceolata* (Lamb.) Hook.	Non-native	8.25%	**9.38%**	12.88%	14.07%	10.44%
Rubiaceae	*Randia armata* (SW.) DC.	Native	7.61%	4.39%	**19.11%**	12.27%	3.65%
Lamiaceae	*Salvia officinalis* L.	Non-native	6.98%	8.79%	*16.88%*	13.77%	11.48%

Certain plants were cited with different frequencies by each generation. These include *Ipomoea batatas* (L.) Lam. and *Brugmansia suaveolens* (Humb. & Bonpl. ex Willd.) Bercht. & J.Presl for the second generation. *Ipomoea batatas* was cited for food and medicinal uses, with its leaves used to treat tooth aches. *Brugmansia suaveolens* was cited as an ornamental and medicinal plant, the leaves of which were referred to as a treatment of urinary infections.

Cunninghamia lanceolata (Lamb.) Hook. was among the most frequently cited plants by the third generation, with ornamental and religious purposes,including its use as a Christmas tree. Finally, *Salvia officinalis* L. was mostly cited by the fourth generation, used as food (as a seasoning), a medicinal plant in the form of infusions to treat various illnesses, and as a ritualistic plant to clean people and surroundings of bad energies.

Respondents involved in cultural associations identified certain plants with higher frequency than those who were not involved in such associations. *Plectranthus madagascariensis* (Pers.) Benth. and *Cyphomandra betacea* (Cav.) Sendtn were among the five most-cited plants by respondents involved in cultural groups. The use of *P. madagascariensis* was related to medicinal properties to treat foot problems, such as bad smell and fungal infections, while *C. betacea* was only cited as a food. On the other hand, the five most frequently mentioned plants by respondents not involved in cultural associations included *Anethum graveolens* L. and *Bidens pilosa* L.. *Anethum graveolens* was cited as a seasoning in various Polish dishes, including sour cucumber, pierogi, gołąbki, and salads. *Bidens pilosa* was cited as a medicinal plant; the whole plant can be used in the form of infusion to treat internal and external infections.

3.3.1 Distribution of Knowledge Between Groups

We found differences in the estimated richness of plants cited between generations, with the fourth generation citing fewer plants than second and third generations (Figure 7). The average number of cited plants between generational groups was also different (Kruskal-Wallis chi-squared = 10.747, df = 2, p value = 0.0046).

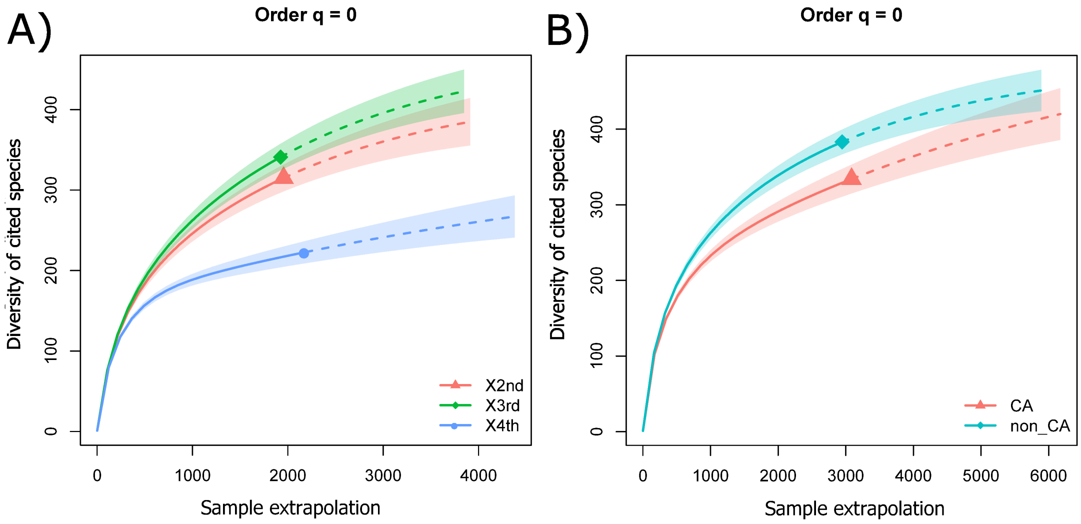
Species richness values differed between respondents involved and not involved in cultural associations, with a little overlap in the extrapolated richness. Although the curve indicates that participants from the cultural association group cited fewer plants than the other group, there were no significant differences in the average number of plants cited between groups (W = 3106.5, p value = 0.2695).

The composition of plant species also did not differ between groups (Figure 8, nMDS stress =0.20; PERMANOVA P = 0.01, F = 3.0135, df = 1; PERMDISP P = 0.02917, F = 4.8516, df = 1). In addition, the composition of plant species cited by each generation (Fig. 3a) did not reveal differences of knowledge between generational groups (nMDS stress = 0.20; PERMANOVA P =0.01, F = 4.1159, df = 2; PERMDISP P = 0.2854,F = 1.2647, df = 2).

3.4 DISCUSSION AND CONCLUSIONS

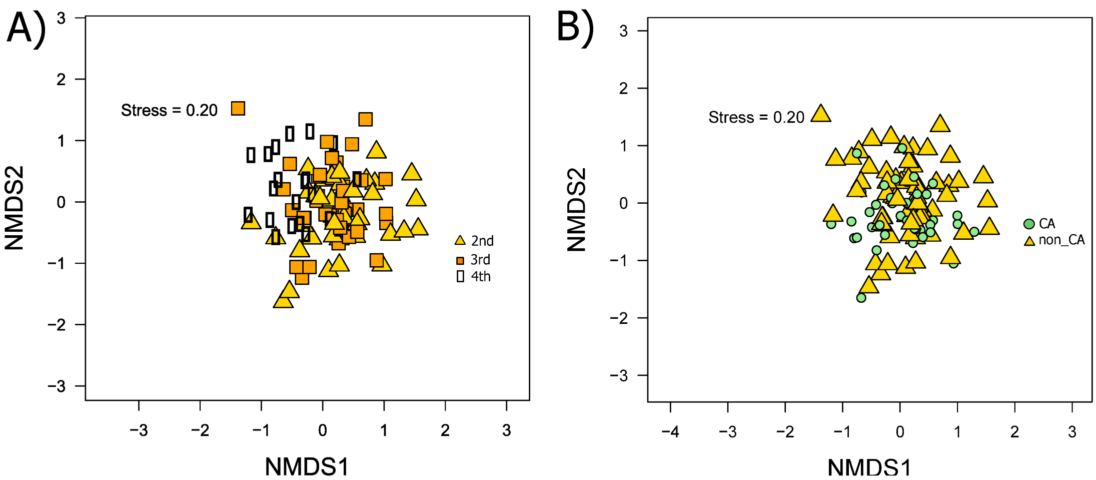
Participants of the fourth generation exhibited significantly less plant knowledge than those in the second and third generations; this partially confirms our first hypothesis that plant knowledge would increase with age. However, those in the second generation showed less plant knowledge than those in the third one. In terms of the average numbers of plants cited, the Kruskal test confirmed differences between generational groups. The second generation was the

Figure 7 – Interpolation and extrapolation curves (n = 150) of the interviews, where q = 0 is the diversity observed; Y represents the diversity of cited species per generation; X is the sample extrapolation. a Diversity observed in each generational group. b Diversity observed in the groups involved in cultural associations (CA) and not involved in cultural associations (non_CA).



Fonte: Ludwinsky, R.H. 2020.

Figure 8 – nMDS of obtained interviews (n = 150). A) Non-metric multidimensional scaling (nMDS) for generational group, STRESS = 0.20. B) nMDS for the group involved in cultural associations (CA) and not involved in cultural associations (non_CA), STRESS = 0.20.



Fonte: Ludwinsky, R.H. 2020.

closest to the original immigrants in this study. We, therefore, assumed that their knowledge had already adjusted to local flora while still maintaining stored plant knowledge from the ancestral country.

As suggested by (MEDEIROS et al., 2012), stored and unused knowledge of plants from the ancestral country may be lost in future generations. Following the same argument, Vandebroek and Balick (2012), in a study with Dominican descendants in New York, found no age-dependency of plant knowledge for the first generation of immigrants. Those authors discussed that changes and losses would be more pronounced in the younger generations. Our results showed that, even with knowledge adapted to the biological, social, and economic realities of Brazil, the pattern of knowledge loss in the fourth generation is prevalent, implying that adapted knowledge is being lost. Pirker et al. (2012) documented a decrease in medicinal plant knowledge between Tyroleans migrants in Australia, Brazil, and Peru. These authors pointed at urbanization and globalization as main drivers for changes in the traditional health services. Urbanization changes plant abundance, diversity, composition, and can lead to changes in people's lifestyle as well as increasing disconnection with nature (FAETH et al., 2005; SOGA; GASTON, 2016).

We did not find any difference in the composition of plants cited by each generation of descendants, confirming our second hypothesis of a significant overlap in the composition of known plants (Table 2). Pasquini et al. (2018) noted a similar result in an intragenerational study on three Afro-descendant communities on the Caribbean coast of Colombia, in which generations knew mostly the same plant species. In the common cluster of known plants of our study, *A. cymbifera* was one of the five most-cited plants across all generations. *Aristolochia cymbifera* is a native species used medicinally, collected by forage in forests. This pattern shows a process of learning and adaptation of traditional medicine to local plants through time. Even though the fourth generation cited fewer plants than the others, the composition of species was largely similar to the second and third generations, although some plants were cited more frequently by a particular generation. This was the case, for example, of *S. officinalis*, which the fourth generation cited more frequently than the others. People from the same generation are exposed to the same process of economic and biocultural negotiations (MATHEZ-STIEFEL; VANDEBROEK., 2012). Therefore, even with a "core" plant knowledge, there are some plants linked to individual social, cultural, and economical experience.

A high number of non-native plants were cited in this survey, a finding that could be related to lifestyle, economic, and biological variables. For example, in the study areas, there are several plantations of food and wood monocultures, and agricultural activities in Brazil are based mostly on introduced species (CORADIN et al., 2011). Even in the past, the small-scale farms of the migrants relied on introduced species such as rye, wheat, and potatoes (DVORAK, 2013). The main native species used in commercial scale, throughout the history of Polish people in Brazil, are *Araucaria angustifolia* and *Ilex paraguariensis* (FICKER, 1973; GERHARDT, 2011; KORMANN, 1980). Although Mello and Peroni (2015) mentioned other native species frequently used in the region (not only by Polish descendants), such as *Psidium cattleianum* Afzel. ex Sabine, *Curitiba prismatica* (D.Legrand) Salywon & Landrum, and *Bromelia antiacantha* Bertol., none of these species were mentioned in this study. Cultural practices that were not adapted to native resources (MEDEIROS et al., 2012) could also explain our results, including other socio-economic changes such as increase in urban areas, increase in exotic crops, and the process of medicalization in case of medicinal plants, which occurred in several parts of Brazil (MELLO; PERONI, 2015; ZANK et al., 2019).

We noted a strong sense of cultural reaffirmation from participants that attended cultural associations. On the one hand, the reinforcement of a cultural identity brings recognition and respect for practices and beliefs. On the other hand, it may lead to denial of plant knowledge deemed to come from other cultures, threatening plant diversity. Despite the cultural reinforcement processes in the study area, our findings showed no significant differences between groups (involved vs. not involved in cultural associations). The potential intergenerational loss of plant understanding can be explained through the standardization process of learning, due to globalization and homogenization of knowledge through media and formal education, so that different points of view and comprehension are suppressed and/or forgotten over time (ASWANI et al., 2018). We suggest that plant knowledge is strongly related to daily practices passed through parents and to observing nature, making cultural associations relatively unimportant in the intergenerational transmission and acknowledgment of plant knowledge. An insightful interpretation of the role of cultural association would be clearer if comparing with others migrants' ethnicities.

Our work compared two subsets (involved in cultural associations and not involved) of the same ethnicity. The phenomenon of cultural associations reflects a collective desire to recreate ancestral memories and cultural identity through cooking, praying, and sharing stories (BROWN, 2011). In the study region, many descendants still live in or near the original migrant settlements, and we suggest that the sense of belonging to a familiar place can play a similar role, such as the cultural association by offering a familiar context to express their identity. One limitation of this study was the quantitative approach, since we analyzed general plant knowledge without correlating its significance and variety of uses within the generational groups. Analytical aspects such as the number of cited plants are not necessarily an effective representation of local knowledge because, even though one generation cited fewer species than others, the overall composition of known species was shared among all generations. Moreover, we did not collect data about transmission processes and shifting drivers of plant knowledge to better understand the role of immigration, adaptation, and formation of cultural associations. Those should form the basis of next steps for further investigations.

In a nutshell, our work shows a quantitative approach to evolution of plant knowledge between generations of immigrant descendants. The plant knowledge erosion across generations corroborates with the overall patterns reported around the world. Observing within the spectrum of a multicultural society, the plant knowledge erosion across generations merits more attention since less knowledge represents a vulnerability factor in biocultural systems. The unfamiliarity with plants leads to a distancing and a change in the relationship between humans and nature and can undermine people's adaptation to dynamic biocultural systems, which often change economically and politically.

4 ARTIGO 2 – “IF THERE’S NO DILL, THE TASTE ISN’T RIGHT”! A COMPARISON OF FOOD PLANT KNOWLEDGE BETWEEN POLISH AND GERMAN DESCENDANTS IN THE CONTEXT OF AN IMAGINED CULINARY COMMUNITY IN BRAZIL.

Se não houver endro, o sabor não está certo! Uma comparação do conhecimento de plantas alimentícias entre descendentes de poloneses e alemães no contexto de uma comunidade culinária imaginária no Brasil.

Submetido na revista *Journal of Ethnic Foods*, 8(9), 2021.

Figure 9 – Uma mesa de boas vindas; trigo, sal e uma broa de trigo e centeio. Registro feito na ocasião da 22ª *Polski Festyn* de São Bento do Sul.

Fonte: Ludwinsky, R.H., 2017.

"If there's no dill, the taste isn't right"! A comparison of food plant knowledge between Polish and German descendants in the context of an imagined culinary community in Brazil.

Rafaela H. Ludwinsky[1,2], Amanda E. Cavalhieri[1], Monika Kujawska[3], Nivaldo Peroni[1], and Natalia Hanazaki[1]

[1]Department of Ecology and Zoology, Laboratory of Human Ecology and Ethnobotany, Federal University of Santa Catarina, Florianópolis, Brazil
[2]Department of Ecology and Zoology, Ecology Post-graduate Program, Federal University of Santa Catarina, Florianópolis, Brazil
[3]Institute of Ethnology and Cultural Anthropology, University of Łódź, Łódź, Poland

ABSTRACT

Food is a cultural marker investigated by several fields of knowledge. The ecological approach to food plants used in human societies can give us insights into food biodiversity and its connection to cultural identity. In our work, we investigate plant knowledge as part of an imagined culinary community among Polish and German descendants in Santa Catarina, Brazil. We interviewed Polish and German descendants and used an ecological analytical approach to discuss patterns of known plants mediated by culture. One hundred years after immigration, we found that ethnic food-centered memories remain. Polish and German descendants share most resources cited, while the difference between plants' use lies in the ethnic memories and food preparation. There is a tendency to acculturate ingredients and tastes by immigrants descendants, using native species to recreate dishes. This scenario, which joins native plants' knowledge and ethnic memories, provides an excellent opportunity to maintain local biocultural diversity in urbanized environments.

Keywords: Urban ecosystems; Immigration; Cross-cultural ethnobiology; Beta diversity; Atlantic Forest.

4.1 INTRODUCTION

Food can act as a cultural marker of identity, while food patterns undergo social, political, and ecological changes (ANDERSON, 2005; HAPPEL, 2012; EMMEZ, 2020). Because eating is a social activity, it links people to their cultural heritage through affective memory of dishes and specific ingredients (LUPTON, 1994). Such memories and knowledge of dishes and ingredients result from cultural, social, and ecological interactions that change over time and are transmitted over generations, forming part of Traditional Ecological Knowlegde (TEK) (BERKES, 1999; BERKES et al., 2000). When people move from their homeplaces to other regions, their food reflects a sense of place and adapts the immigrants' TEK to a new socio-ecological environment (PARASECOLI, 2014; FONTEFRANCESCO et al., 2019). Researchers from different parts of the world have documented these adaptations of migrants' TEK to the use of medicinal and food plants. Examples of such work include studies by Pirker et al. (PIRKER et al., 2012), Kujawska and Pieroni (KUJAWSKA; ŁUCZAJ, 2015), and Ceuterick and Vandebroek (CEUTERICK; VANDEBROEK, 2017). These studies have provided a critical foundation for an understanding of food as experienced in various migratory, environmental, and identity contexts.

In the south of Brazil, European immigrants arrived *en masse* between the late 19th and early 20th centuries as a result of a governmental policy to 'whiten' the population (SANTOS, 2002). These waves of immigration were comprised largely of Germans, Italians, and Poles. The immigrants who arrived in Brazil had a variety of customary practices and work experiences depending on their region of origin. In São Bento do Sul, Santa Catarina state, immigrants arrived from East Prussia, Austria, Bavaria, Bohemia, and Galicia. Those from Galicia, a region of the Austro-Hungarian Empire that now comprises southeastern Poland and western Ukraine, were most frequently engaged in agriculture and livestock rearing, as well as in the exploitation of natural resources such as wood and yerba mate (*Ilex paraguariensis* A.St.-Hil.) in unsettled areas (FICKER, 1973). Meanwhile, immigrants from West Prussia would often work in skilled trades such as tailors, carpenters, and shoemakers (FICKER, 1973).

Over time, immigrant settlements transformed into urban centers, changing the lifestyles of their inhabitants. Processes such as urbanization, sedentary life, growing consumption of processed foods, and the disappearance of traditional rural occupations affected the TEK of immigrants and their descendants (HAWKES, 2006; PIERONI et al., 2012; SOGA; GASTON, 2016; TURREIRA-GARCÍA et al., 2017). Urbanization influences the diversity of species available. Shifts in livelihoods towards less rural occupations tend to reduce the diversity of cultivated species and opportunities for an affordable and healthy diet, a phenomenon known as a food desert (CUMMINS; MACINTYRE, 2002).

We propose an ecological analytical approach to address changes caused by urbanization and livelihoods among the descendants of immigrants and compare the knowledge of food plants between Polish and German descendants in southern Brazil. Our approach focuses on dissimilarities in the composition of known food species between groups of immigrants or the beta diversity of known plants (JURASINSKI et al., 2008; BASELGA, 2010). Beta diversity shows the differences between the richness [4] of two sets of plants. It allows for the investigation of patterns in known plants when a group with a lower richness (fewer species) is nested as a subset of a group with higher species richness (JOST et al., 2010). The beta diversity approach can give insights to discuss patterns of known plants mediated by culture. Those patterns can reflect local factors, such as deforestation and transformation of habitats, occupational demand changes, and global forces, such as translocal agri-food and value chains (CÁMARA-LERET

[4] Richness is an ecological term that stands for a number of species

et al., 2019).

We assume that Polish and German descendants in Brazil have a different ethnic memory related to the immigrants' farming (rural) and craft/trade (urban) experiences, and that is reflected in descendants' cuisine. The objectives of this study were twofold: 1) to compare the plants cited with traditional, indistinct, or mixed uses in the migrant descendants' cuisines; 2) to investigate the beta diversity (diversity between groups) of food plants known between Polish and German descendants. During their settlement in Brazil, Polish immigrants occupied mostly rural areas while Germans occupied mostly urban ones. Polish immigrants worked mostly as farmers and depended economically on the commerce of food plants in urban food fairs, in which most of the buyers were German immigrants settled in the urban area. Thus, we hypothesize that Polish descendants would know more species (both native and non-native species) than German descendants. Over time, descendants of German immigrants moved throughout the territory independently of their original settlement, concentrating in urbanized areas. We therefore expect a dissimilarity of knowledge about plants between the two groups of descendants. In our second hypothesis, we expect to find a nested pattern of the richness of plant knowledge, with the German descendants' knowledge representing a subset of knowledge of the Polish descendants. Because German descendants would not depend primarily on small-scale agriculture, they complemented their diet with food mostly from farmers, who were primarily Polish descendants. Finally, we assume that knowledge and memories are passed down to descendants' generations. However, TEK responds to various factors such as political, economic, ecological, and cultural forces – including the interaction of different ethnic groups (ŁUCZAJ et al., 2012; MEDEIROS et al., 2012; VLKOVÁ et al., 2015). Therefore, we expect to find, on average, a report of mixed knowledge of food plants in immigrants' ethnic cuisines, perhaps showing a mixture of traditional ingredients and those acquired in the new country in both ethnic groups.

4.2 METHODS

4.2.1 Study location

We conducted the ethnographic and ethnobotanical field study in the municipality of São Bento do Sul, on the northern plateau of Santa Catarina state, southern Brazil (Figure 10). Immigration to São Bento do Sul was mostly composed of immigrants of Germanic and Polish origin, who predominantly arrived during the "Brazilian fever" (1880-1910) immigration wave (PIETRASZEK, 1974; RODYCZ, 2011; FENDRICH, 2017). Local historians believe that most Poles and Germans immigrated from the provinces of Galicia and Bohemia in the former Austro-Hungarian Empire (1864-1918) (FICKER, 1973; FENDRICH, 2017). Today, of the 84,507 inhabitants of the municipality, about 70% have Polish roots, and about 90% have German ancestry[5]. The study area also comprises groups of Italian, Ukrainian, and Portuguese

[5] Survey according to cultural entities and municipal secretariats of each municipality.

descent (IBGE, 2010c). In the municipality, 95% of the people live in urban areas and 5% in rural settlements. Less than 0.05% of the population was self-declared indigenous (IBGE, 2010c).

Figure 10 – Location of São Bento do Sul, the municipality where sampling was conducted.

Fonte: Ludwinsky, R.H. 2021.

4.2.2 Data collection

We selected 30 collaborators of each ethnicity through a systematic sampling using data from the historical archives from original immigrational settlements (see Appendix C), followed by snowball sampling according to the following criteria: (a) age 18 years or older; (b) identified herself/himself as Polish or German descendant; (c) living in the area for at least ten years; (d) agreed to participate in this research. We interviewed the collaborators using a semi-structured protocol after obtaining prior informed consent between January 2017 and January 2018.

We collected data on age, gender, knowledge of the immigrant language, and each collaborator's life history through the interviews. We asked each collaborator to freely list the plants they knew and used, and we asked about the purposes of uses for each plant. Whenever possible, we recorded the names of plants in Polish and German and information on traditional dishes. None of the plants collected raised doubts concerning their identification; largely consisting of common species such as kale (*Brassica oleracea* L.), lettuce (*Lactuca sativa* L.), apple (*Malus communis* Desf.). Plant collections damaged by various actions, such as transport damage and attack by fungi and insects, were scanned and used for identification. Thus, no voucher specimens were taken. The first author conducted taxonomic identification through detailed photos and scans of the specimens, and the identification was confirmed by with specialists from the FLOR herbarium of the Federal University of Santa Catarina. To ensure the credibility of identification, photos were compared with a biological database for plants in the study area (SCHWIRKOWSKI, 2021). The nomenclature was checked with The Plant List (THE PLANT LIST, 2013). The REFLORA database (REFLORA, 2015) was used to check the origin of the plants (native or non-native). Native species are considered those which are native to Brazil, including naturalized species. Additionally, the first author recorded qualitative notes in a field diary.

4.2.3 Analyses

Listed plants were a *posteriori* categorized as traditional, indistinct, or mixed, based on additional questions about the culinary uses of each plant. We considered plants with traditional use to be non-native plants used in traditional dishes and recipes. Mixed-use plants include those which are native to Brazil and ones that were present in the region prior to the arrival of German and Polish immigrants, which were subsequently adapted in the traditional immigrant dishes. For example, we included non-native Brazilian species such as banana (*Musa paradisiaca* L.) in this category since it is considered by the interviewees to be native and part of Brazilian identity. Plants with indistinct use are those which have not been associated with traditional cuisine. A traditional immigrant dish was considered to be one that interviewees identified as being passed down between generations (family memories).

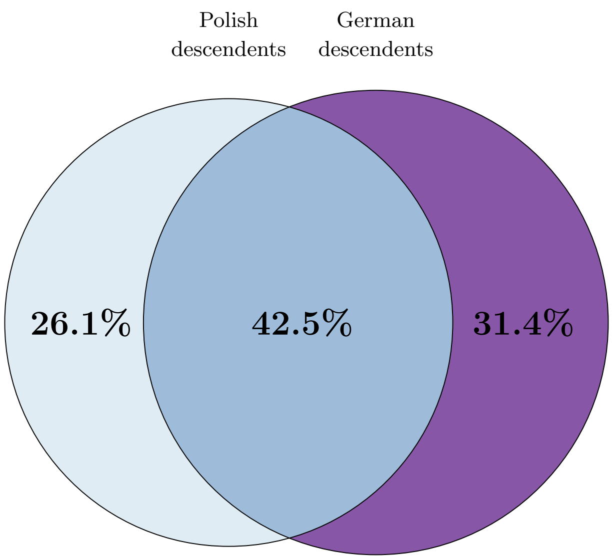
We used descriptive statistics to analyze data from the interviews and tested means of the cited plants between descendant groups with the Student's t-test. To test dissimilarities and nestedness, we partitioned beta diversity using the *vegan* (OKSANEN et al., 2018) and *betapart* (BASELGA; ORME, 2012) packages in the R platform (R DEVELOPMENT CORE TEAM, 2018) using a presence/absence Jaccard matrix. Since we aimed to evaluate the differences in participants' knowledge of plants, we used dissimilarity to highlight rare plants, which we define as those with only one or two mentions. We tested differences in average of dissimilarity in the beta diversity of species cited between descendant group with an analysis of variance (ANOVA). To test the averages between traditional, indistinct, and mixed-use food groups, we used the Kruskal-Wallis test.

4.3 RESULTS

We interviewed 18 female and 12 male Polish descendants, and 23 female and seven male German descendants. The interviewees' age varied from 18 to 90 years, with an average age of 61 years for Polish descendants and 64 years for German descendants. All interviewees were Portuguese speakers. German descendants use their mother tongue at higher frequencies than Polish descendants. Some 70% of German descendants know a little of the German language and use a few words on a daily basis. About 20% of Polish descendants know a little of the Polish language but hardly use it. However, some Polish descendants knew both languages (Polish and German) since they had engaged in trade with German descendants: “[. . .] if we wanted to sell our products we needed to communicate. Therefore, we learned the names [in German] of the most important things [. . .] (74yrs, male, Polish descendant)”.

We recorded 153 folk plant names from which we identified 146 botanical species from 54 botanical families (The full list of recorded plants can be seen in more detail in the Additional file Appendix D). The most representative families, in terms of the number of species, were Rosaceae (12 species), Myrtaceae (11 species), and Lamiaceae (9 species). Polish descendants mentioned 105 edible plants, while German descendants listed 113 edible plant species, with no difference in the average number of plants cited by either ethnicity (t-test, p=0.2253). Forty-two percent of the plants were common to both groups (Figure 11). We found no differences in the beta diversity of species cited between descendant groups (ANOVA F=3.5484, p=0.06462), nor did we find any nestedness pattern between the two descendant groups (ANOVA F=2.6531, p=0.1088).

Figure 11 – Exclusive and shared plants cited by interviewees in São Bento do Sul, Brazil (30 Polish descendants and 30 German descendants).

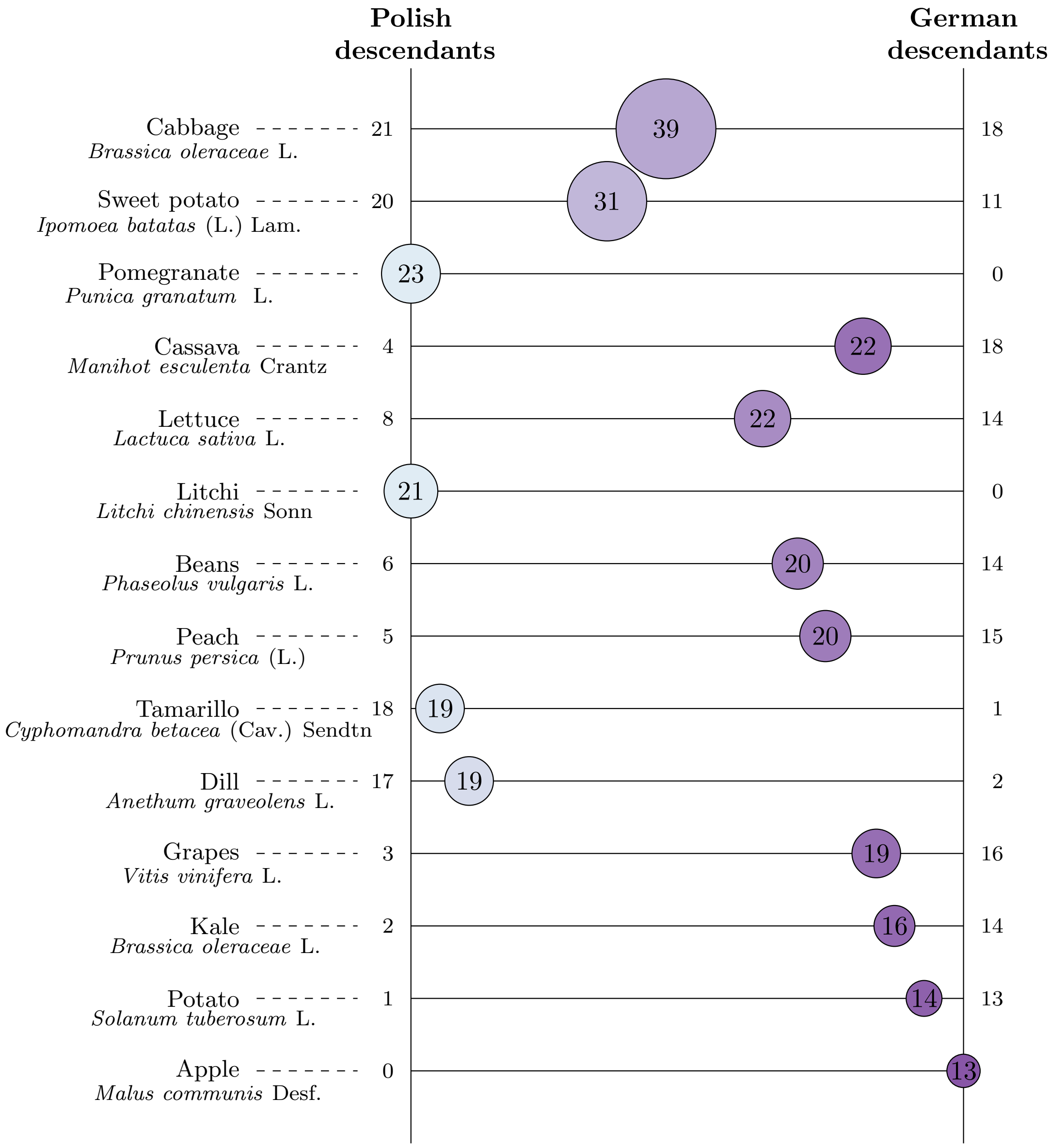


Fonte: Ludwinsky, R.H. 2021.

Most of the documented plants (80%) are non-native species and still in use in daily cuisine: about 83% for Polish descendants and 71% for German descendants (Figure 12). The top two most commonly cited plants were *Brassica oleraceae* L. (Polish descendants: 21 citations – 70%; Germans descendants: 18 citations – 60%) and *Ipomoea batatas* (L.) Lam. (Polish descendants: 20 citations – 66%; German descendants: 11 citations – 36%).

We noted that annual ethnic festivities such as *Polski Festyn* (Polish festivity) and *Schlachtfest* (German slaughter festival or meat festival) occur in the study area. In these festivities, people can taste the local cuisine apart from home and family context, including traditional, mixed, and indistinct plants. On average, the plants differed with respect to their uses between

Figure 12 – Plant citations for each group of descendants (blue=Polish descendants; purple=German descendants; darker tones reflect a stronger association with each group). The numbers on the left are the number of times the Polish descendants mentioned the plant, and the numbers on the right correspond to mentions by German descendants. The numbers inside the circles are the total number of citations of each plant. The size of the circle is proportional to the percentage of all mentions represented by each plant.



Fonte: Ludwinsky, R.H. 2021.

traditional (50%), mixed (30%), and indistinct (92%) (Kruskal-Wallis chi-squared = 10.747, df = 2, p-value = 0.0046). The names of some of the plants and their preparations are in Table 3.

For example, among the traditional plants, dill (*Anethum graveolens* L.) is a common spice in Polish descendants' cuisine. Interviewees identified *pierogi* as another traditional Polish recipe, which uses potatoes (*Solanum tuberosum* L.) and the preparation of which had remained unchanged since the time of immigration. Some traditional ingredients were mentioned as having been forgotten, either because they are no longer cultivated or because they are not

Table 3 – Examples of traditional plants mentioned by German and Polish descendants, and their associated uses and memories. Pt – Brazilian portuguese language, Gd – German descendant, and Pd – Polish descendant. Local names as known by the descendants of each ethnicity are marked with '*'.

Botanical family	Species	Local names	Uses and memories
Amaranthaceae	*Beta vulgaris* L.	Beterraba – Pt *Rotebette** – Gd	Canned beets – Pd, Gd Sweet and sour salads – Gd Soups – Pd
Apiaceae	*Anethum graveolens* L.	Endro – Pt *Koper* – Pd	The main ingredient of canned vegetables and sour cucumber – Pd "If there is no Koper [referring to the dill used in sour cucumber seasoning], the taste isn't right; something's missing." (63yrs, female, Pd)
Brassicaceae	*Armoracia rusticana* P.Gaertn., B.Mey. & Scherb.	Raíz forte – Pt *Crem** – Gd, Pd *Chrzan*, *quichan** – Pd	The root is grated and canned. It is used as a side dish, accompanying recipes made with fatty meats, mainly pork.
	Brassica oleracea L.	Repolho – Pt	Fresh or canned sour cabbage (chucrute)– Gd, Pd
		Couve rabano – Pt *Colorabe* – Gd	Fresh or added in vegetable soups – Gd
Convolvulaceae	*Ipomoea batatas* (L.) Lam.	Batata doce – Pt *Bataten** – Gd	Side dish, accompanying recipes made with pork – Gd
Fabaceae	*Phaseolus vulgaris* L.	Feijão – Pt *Vasola** – Pd	Bean stew "The beans came to replace the *tatarka*, and my mother planted a lot of *tatarka*. I didn't even get to know it [referring to *tatarka*] [...] then the beans came, and we consumed it a lot." (73yrs, female, Pd)
Lamiaceae	*Salvia officinalis* L.	Sálvia – Pt *Szalwia* – Pd	For flavoring broths, sauces, and meats – Pd
Polygonaceae	*Fagopyrum esculentum* Moench	Trigo sarraceno – Pt *Tatarka** – Pd	Porridge, cooked side dish, haluski filling – Pd
	Rheum rhabarbarum L.	Ruibarbo – Pt *Rababa** – Gd	Toppings for sweets, especially *cuque* – Gd
Rosaceae	*Prunus persica* (L.) Batsch	Pêssego – Pt *Fêse* – Gd	Pies, jellies, candied fruits, cold soups – Gd
	Malus domestica Borkh.	Maçã – Pt Apfel - Gd	Pies, jellies, candied fruits, cold soups – Gd
Rubiaceae	*Coffea arabica* L.	Café – Pt *Kawa* – Pd *Kaffe* – Gd	Memories associated with rainy days, when families roasted and ground coffee at home – Pd, Gd "What I liked the most about coffee was the flowers, and when people roasted it [...], the roasted coffee smell would travel far." (63yrs, female, Gd)

available in markets. These include buckwheat (*Fagopyrum esculentum* Moench), also called *tatarka* by Polish descendants. It was mentioned as an ingredient used in the past and cooked as a porridge or as part of the filling for *haluske* (stuffed cabbage, also known as *gołąbki*). Fruits such as peach (*Prunus persica* (L.) Batsch), apple (*Malus domestica* Borkh.), and pears (*Pyrus communis* L.) are associated with dessert foods like jams. Among the German descendants, these fruits are also consumed in cold soups. German descendants identified their traditional cuisine as including kohlrabi (*B. oleracea*) and common sorrel (*Rumex acetosa* L.), mostly picked fresh from the garden and eaten raw or added to hot soups.

Both groups of descendants mentioned the traditional consumption of cabbage (*B. oleracea*) and sour cucumber (*Cucumis sativus* L.), as well as wheat and rye as being closely linked to cultural expressions. Although the resources themselves are the same, the ways of preparation can change among the groups, as is the case for sour cabbage or sauerkraut. Mostly known as *chucrute* by both groups of descendants, sour cabbage is prepared by German descendants with only grated cabbage and salt, then left to ferment. The recipe of sour cabbage is linked to the German descendants' idea of their heritage. Some Polish descendants mentioned the same preparation, but added grape leaves and sometimes pieces of bread to help in fermenting. Both descendant groups cited the use of wooden or clay barrels in the past to store cabbage while fermenting (Figure 13). Cucumbers were also fermented in these barrels. However, preparations of sour cucumbers always involved dill among Polish descendants. Some plants were referred solely by their traditional names (in German or Polish), and others were mentioned in Portuguese as well.

Figure 13 – a) Homemade sour cucumbers, a recipe of Polish descendants with grape leaves and dill. b) Clay barrel used in the past by German descendants for sour cabbage.

(a) (b)

Fonte: Ludwinsky, R.H., 2018.

German descendants often mention mixed-use plants with expressions like "this is not traditional, but we use it", as is the case for banana (*M. paradisiaca*) used in a traditional sweet known as *cuca* or *cuque* (a type of cake). The same occurs with the use of sweet potatoes (*I. batatas*), generally used in pork dishes. "[...] Sweet potatoes are not German, they are indigenous, but we use them, our parents planted and taught us to eat [...]" (50yrs, female, German descendant). Both groups of descendants mentioned the use of yams (*Colocasia esculenta* (L.) Schott, *Dioscorea bulbifera* L., and *Xanthosoma* sp.) in the preparation of bread and kneaded together with the wheat dough. Plants of indistinct use include native plants such as the Araucaria pine tree (*Araucaria angustifolia* (Bertol.) Kuntze), native cherry tree (*Eugenia involucrata* DC.), and Brazilian staple foods, such as rice (*Oryza sativa* L.), beans (*Phaseolus vulgaris* L.), cassava (*Manihot esculenta* Crantz), and lettuce (*Lactuca sativa* L.). Although plants for indistinct uses were not mentioned as part of traditional recipes, some of their traditional names were remembered during interviews, such as the case for *piąkse* (pine nut from *A. angustifolia*). For Polish descendants, some of the most cited plants appear in the group of indistinct use, such as pomegranate (*Punica granatum* L.) and litchi (*Litchi chinensis* Sonn.). Pomegranate was cited as a medicinal food and was consumed in natura, as juices and syrup. However, litchi was consumed only in natura, and its use seems to be recent according to residents (less than five years).

4.4 DISCUSSION

We found that almost 50% of edible plants were mentioned by both groups of descendants. German descendants cited a greater number of total species than Polish descendants did. Therefore, we have not corroborated our first hypothesis, of Polish descendants having a greater knowledge of plants than Germans due to a history of agricultural practice. We also did not observe dissimilarities in their knowledge. Over generations, as we can see, descendants of Polish and German migrants tend to incorporate local ingredients with greater frequency or substitute traditional ingredients with what is available in the host country (KITTLER et al., 2016). In a study on the adaptation of traditional cuisine by German immigrants in the southern Brazilian state of Rio Grande do Sul, Friendrich and Witter (FRIENDRICH; WITTER, 2012) argued that foodways are restructured according to the continuity of traditional food. Thus, recreations of traditional dishes occur with ingredients produced in the new territory.

As there is no difference (in terms of the number of plants mentioned) of plant knowledge, we also reject the second hypothesis of the knowledge of the German descendants being nested within Polish descendants' knowledge. Since there is a low variation of plants mentioned among the descendants, a large part of these species is non-native species in Brazil (80%). Among Polish and German descendants in Santa Catarina, the botanical families of Rosaceae and Lamiaceae make up the largest numbers of non-native species in Brazil. These botanical families are linked with the introduction of commercial species, with uses generally characterized as traditional and mixed uses (BENNETT; PRANCE, 2000). Myrtaceae is one of the most representative botanical families in ethnobotanical studies and floristic surveys in

Brazil due to the vast richness of species and its prominence in the Atlantic Forest, with many species bearing edible fruits (CRUZ; KAPLAN, 2004; SILVA A.; MAZINE F., 2016). In a study on the distribution of plant knowledge conducted in a community of German descent in the same phytogeographic region as our study area, Poderoso et al. (2012) present the most commonly cited food plants, which featured a high occurrence of Rosaceae and Myrtaceae. We found that our results are consistent with those of earlier studies, including (PODEROSO et al., 2012).

Most plants had indistinct uses among Polish and German descendants, meaning that they were not associated with a traditional recipe. This disconnection between ingredients and foods of indistinct origin highlights the patterns of acculturation in eating practices. Although ethnic memories exist and are associated with indistinct plant resources, such as the traditional names given for these plants, the loss of memories about food preparation practices is notable. This memory loss has been reported in the literature: the most recent generations tend to know less and forget traditional knowledge about plants as their livelihoods change, which can favor a distancing from ancestral memories (MEDEIROS et al., 2012; ASWANI et al., 2018). Still, it is worth noting that for both groups, 30% of the plants mentioned have mixed-use, while 50% compose traditional recipes. Thus, although the vast majority of resources are of indistinct use, there are plants and food preparations that are alive through time, as is the case for sweet potato and cabbage, the latter of which may be even considered a marker of identity for both groups of descendants in the realm of edible plants.

Food-centered memory (HOLTZMAN, 2006) seems not to be directly related to preserving the language from the country of origin in the daily lives of the descendants of German and Polish migrants. Although German descendants have preserved their language much better than their Polish counterparts, food proves to be a friendly symbol of identity for younger generations despite a lack of interest in the immigrant language (TELEGINSKI N., 2014). Among both descendant groups, we observe the use of a similar number of food plants as well as a similar number of plant names mentioned in their mother tongues and a similar proportion of traditional uses (50%) of plants. These findings should be considered in future studies focused on the relationship between food plants and language in the migratory context.

On the other hand, the fact that German descendants use similar or even a slightly higher number of food plants than Polish descendants may be connected to their access to rural food sold at town fairs and imported food in town markets from other parts of Brazil. Perhaps the access to a greater number of food sources and less self-subsistence than Polish descendants has contributed to the diversified food ingredients employed in their cuisine. Finally, German migrants who settled in urban areas from the very beginning had a longer trajectory in organizing festivities arranged around food and identity. For the same reasons, they could influence the popularization of *chucrute* instead of *Kapusta kiszona* (Polish equivalent) on a regional level (KUHN et al., 2018). We suggest that ethnic food memories are kept alive in a communitarian way. Actions in communities, such as the festivities and the availability of resources through local farmers' markets, contribute to the maintenance of culinary memories.

4.5 CONCLUSION

When people move between countries, it takes time to stabilize their learning process about the place, local customs, and local biodiversity. Although livelihoods have changed, and immigrants' descendants tend to acculturate ingredients and tastes, ethnic memories are still a potent connector with food. The ethnic memories associated with the food among Polish and German descendants are not strictly related to different sets of plant species used but rather in food preparation memories. Immigrant food knowledge and memories are commonly associated with many non-native plants in the host country. The challenge in multicultural societies lies in valuing native plants and local knowledge while also maintaining knowledge that may be close to disappearing. When we place the plant knowledge in urbanized environments, as is the case in the study area, incorporating knowledge of native plants associated with ethnic names and memories –though limited– provides an excellent opportunity to maintain local biocultural diversity.

5 ARTIGO 3 – OVER 100 YEARS OF IMMIGRATION IN BRAZIL: CAN WE SEE CULTURAL FEATURES IN HOMEGARDENS?

Mais de 100 anos de imigração no Brasil: podemos ver características culturais em quintais?

Figure 14 – (a) Bairro Alto Paraguaçú em Itaiópolis, rua Alfredo Schneider na década de 1930. (b) Araucária está entre as espécies compartilhadas em quintais urbanos e áreas de floresta.

(a)

(b)

Fonte: (a) Arquivo Nacional, 2020; (b) Ludwinsky, 2021.

Over 100 years of immigration in Brazil: Can we see cultural features in homegardens?

R. H. LUDWINSKY[1,2], N. PERONI[1], AND N. HANAZAKI[1]

[1]Department of Ecology and Zoology, Laboratory of Human Ecology and Ethnobotany,
Federal University of Santa Catarina, Florianópolis, Brazil
[2]Department of Ecology and Zoology, Ecology Post-graduate Program,
Federal University of Santa Catarina, Florianópolis, Brazil

5.1 ABSTRACT

Homegardens are systems historically built and evolved over centuries of biological and social transformations. They are landscape unities where humans intensively manage the composition of species. We investigated the forest flora composition in homegardens (including native and non-native species) in a place with Polish immigration history. We aim to understand whether the species found in older and recent homegardens are dissimilar, and how much richness is shared with forest patches nearby. We found that old homegardens have greater species richness and abundance compared to recent homegardens. However, old and new homegardens do not show species dissimilarity. Concerning forest species, the old homegardens share more native species with the forest in relation to the recent homegardens. *Araucaria angustifolia* is a native species found in both areas and has an important role as a nurse plant.

Keywords: Homegardens; Immigration; Historical ecology; Cultural niche.

5.2 INTRODUCTION

Homegardens are one of the oldest known land-use systems. Such systems are historically built and evolved over centuries of biological and social transformations (NAIR; KUMAR, 2006). One way of investigating these transformations and historical changes in the landscape is through historical ecology. Such discipline seeks to understand past human legacy, for example, through species composition and niche construction investigation (BALÉE, 1998, 2006). Studies on historical ecology have raised evidence of such human-driven effects in landscapes from pre-Columbian peoples until today (BALÉE, 2006; REIS et al., 2014; MELLO; PERONI, 2015; CRUZ et al., 2020).

Different contexts of economic and cultural transformations changed the relationship of people, plants, and consequently, the landscape (ALEXIADES, 2005). In recent history, European immigration waves between the late 19th and early 20th centuries to Brazil represent a milestone of economic, social, and environmental changes due to the replacement of slave labor through immigrants (SANTOS, 2002; PACYGA, 2005; RODYCZ, 2011). Past and current interactions of immigrants and their descendants can be reflected in the landscape; for example, the role of gender perceptions and use of the landscape was studied within German descendants in southern Brazil (PODEROSO et al., 2017). Among these German immigrants, Milanesi et al. (2013) studied the human influence on a Brazilian native species of palm (*Euterpe edulis*) in landscape units and found that due to the importance of the species to the communities of descendants, the high management and importance of this species makes it to be found in different landscape units, such as secondary forest and homegardens.

In southern Brazil, the Santa Catarina Plateau landscape drastically changed since immigrants' arrival due to land use for agriculture, timber, and yerba mate extraction; especially in the municipality of Itaiópolis, which received the most significant number of Polish immigrants, that until today has a solid economic profile linked to agriculture (FICKER, 1973; RODYCZ, 2011). Over generations, immigrants and their descendants have shaped landscapes in various ways, from the beginning of the settlements through direct forest exploration to the highly managed homegardens, and transmitting their Traditional Ecological Knowledge (TEK) gathered. TEK is a body of knowledge resulting from cultural, social, and ecological interactions that change over time and are transmitted over generations (BERKES, 1999; BERKES et al., 2000). Through homegardens, we can observe the TEK reflected in the plants chosen and managed and, in the case of perennial tree species, in the incorporation of these elements into the cultural landscape.

In the landscape, homegardens form mosaics of intensely managed areas, where the increase or exclusion of floras goes through human activities and decision-making (ALBUQUERQUE et al., 2015). For example, Kujawska et al. (2018) and Peroni et al. (2016) show the importance of studying highly managed environments such as homegardens by discussing the landscape structure of homegardens of Paraguayan migrants in Missiones, Argentina, and Azorean descendants in Florianópolis, Brazil, respectively. Both studies present where the homegardens function as cultural maintenance spots and springboard for plant domestication. Therefore, because humans shape niche space through conscious and unconscious selective pressures, they act as niche constructors (SMITH, 2012; ELLWANGER; LAMBERT, 2017).

Niche construction theory recognizes environmental transformations by organisms towards a biological advantage of maintaining the species (niche construction) and their legacy overtime (ecological inheritance) to be evolutionary processes in their own right (ODLING-SMEE et al., 2003, 2013). Therefore, humans as niche constructors modify the environment and create conditions to support the species itself, being the transformed environment and the TEK elements of inheritance transmitted over time (JOHNSON et al., 2020). For example, Albuquerque et al. (2018) discuss how cattle ranching practices in Araripe National Forest (FLONA – Araripe) favored the heliophytic plant populations, as pequi tree (*Caryocar coriaceum*), through the open of trails made by the cattle. The FLONA – Araripe conservation management established the removal and prohibition of cattle in the forest, leading to an increase in vegetation, which negatively affected the abundance of heliophytic plants. Later on, the economic practice would shift from cattle ranching to plant foraging of *C. coriaceum*. In this example, cattle ranching's cultural practices as an economic activity generated conditions in the environment that altered the population dynamics of the local plant species. With the changes through the prohibition of cattle ranching in FLONA – Araripe, its inhabitants' main economic activity now is in the foraging of primarily vegetal resources. Thus, the environment modified through human action is inherited together with the TEK.

In urban areas, homegardens are highly managed landscape unities, and they have an essential role in promoting diversity and food security, adaptation to climate change, life quality, and connectivity between urbanized landscapes and remnant forest areas (MATTSSON et al., 2013; CAPALDI et al., 2014; PERONI et al., 2016; ÁVILA et al., 2017; SHACKLETON et al., 2017). In multicultural societies, recent homegardens can comprise mostly non-native plants because different cultures can manage their homegardens according to their preferences (ALBUQUERQUE et al., 2019). Besides, the interculturality process leads to the incorporation of external elements into the local culture. For example, in Brazil, most of the economic cultivated and commercialized food plants are composed of a few non-native species (CORADIN et al., 2011), and the traditional/local pharmacopeias incorporate several non-native species (CANIAGO; STEPHEN, 1998). Even among indigenous groups, several non-native species are present in the pharmacopoeias (BENNETT; PRANCE, 2000).

In Brazil, older European immigration waves (from about 100 years ago or more) play an essential role in the configuration of urban spaces and the cultural reflection of the management of homegardens. This configuration reflects the sale of land to immigrants, the clearings of the forest for settlements, and the exploitation of forest products. Older homegardens may still have trees and palms resulting from the urban incorporation process in the settlement areas, representing a mark of the original landscape within an urban environment. Therefore, the investigation of migration processes is critical to understanding native and non-native plant diversity patterns in urban areas. Nowadays, more than half of world's population lives in urban areas (55%) and the projection is to increase to 68% by 2050 (UNITED NATIONS, 2010). In this scenario of increasing urbanization, homegardens play an essential role in safeguarding sociobiodiversity, including both native and non-native species.

In this study, we investigate the flora composition (arboreal, arborescent elements, and palm trees) in homegardens, including native and non-native species. We considered that indigenous peoples historically managed forest areas before the European settlers, and along the last century the immigrants and their descendants have modified the landscape intensively, changing forest areas into urban and farm areas, yet also maintaining elements of the native flora.

Our focus is to understand whether the species found in older and recent homegardens are dissimilar, and how much richness is shared with forest patches nearby. In our first hypothesis we expect to find a dissimilarity of species between old homegardens and younger ones. We assume that older homegardens would have higher species richness than younger ones due to two factors: 1) the accumulation of managed plants along the time, and 2) because in our study area the older homegardens are closer to the matrix of native forest, thus are more prone to receive propagules of native species. Besides, the proximity to forest patches allows people to access and use these environments easily. Secondly, we test if older homegardens share more native species with the native forest, which could show the historical incorporation of native elements into these highly managed environments. Through this investigation, we discuss the composition and structure of plant species found in old and younger homegardens, and the extent to which the human selection of species present in these systems portrays the incorporation of native elements of Atlantic Forest.

5.3 METHODS

5.3.1 Study location

We conducted the study in the municipality of Itaiópolis, on the northern plateau of Santa Catarina State, southern Brazil (Figure 15). Itaiópolis has approximately 21.780 inhabitants (IBGE, 2020), of which 90% has a Polish ancestry (City Hall estimative, 2020) from the “Brazilian fever” (1880 – 1910) immigration wave (PIETRASZEK, 1974; RODYCZ, 2011; FENDRICH, 2017). Therefore, the city has a substantial Polish influence, mainly in old and historic neighborhoods, such as Alto Paraguaçú, whose inhabitants are directly associated with immigration history. In more recent neighborhoods, there is an ethnic influence from other cultures, in addition to Polish. Since most immigrants were rural workers, the municipality still maintains characteristics of a small rural town, with 10k inhabitants of rural areas and 11k from urban ones (IBGE, 2020). Itaiópolis is inserted in the rainforest on the Atlantic Forest domain, one of the biodiversity hotspots (MYERS et al., 2000).

The Forest phytophysiognomy is mixed ombrophilous forest, also known as Araucaria or Pinhais Forest and covers a large part of the Santa Catarina plateau. Araucaria Forest has the greatest richness of wood species than other phytogeographic regions of the Atlantic Forest (KLEIN; REITZ, 1978). In in the northern plateau, the Santa Catarina Floristic and Forest Inventory (IFFSC) (GASPER et al., 2013) found a decrease of 39 tree species for the phytophysiognomy of mixed ombrophilous forest, in comparison to a previous study by Reitz et al. (1979). This decrease can be related to the land use along the last decades, continuing a process that have marked the history of Santa Catarina (TRES et al., 2011).

The history of Itaiópolis begins in 1891 with the creation of the settlement named Lucena. In 1918 the settlement was emancipated as a municipality and was renamed Itaiópolis. The neighborhood of Alto Paraguaçu is one of the oldest neighborhoods in Itaiópolis (Figure 16) and is recognized as a historical heritage due to its importance to immigration, mainly from Polish origin families that settled there. Due to the date of immigration settlement in Alto Paraguaçú, it is estimated that this neighborhood is approximately 130 years old. It is still a place that houses many families who have always lived there. With the municipality’s growth, other neighborhoods emerged, including the neighborhood of Vila Nova (literally translated as "new village"), which is closer to the center of the town and is approximately 70 years old.

Figure 15 – Location of Itaiópolis, the municipality where sampling was conducted. Black and blue markers represent surveyed areas within the urban perimeter, while the orange ones represent the Inventário Florístico e Florestal de Santa Catarina (IFFSC) Sampling buffers.

(a)

(b)

Source: Ludwinsky, R.H. 2021.

Figure 16 – Neighborhood of “Alto Paraguaçú”/A1 (a) Alfredo Schneider Street in the 1930s (b) Alfredo Schneider Street in 2018. Neighborhood of “Vila nova” (c) View from the top of Getúlio Vargas street in 1964 (d) Alexandre Ricardo Worell Avenue in 2019; this avenue follows ahead towards “Alto Paraguaçú” neighborhood.

(a)

(b)

(c)

(d)

Source: Old pictures: National and municipal archives (a)1964; (c)1930. New pictures: Ludwinsky, R., H. (b)2018; (d)2019.

5.3.2 Data collection

We used data from urban homegardens and forest areas, including both primarily collected data and secondary sources (IFFSC, 2019; POLIZZO et al., 2014) . To sample the urban homegardens, we selected two areas within the municipality's urban perimeter according to the following criteria: 1) An old neighborhood with historical linkages with the Polish settlements (A1); and 2) a younger neighborhood not directly linked with the history of Polish settlements, but with a diffuse Polish influence (A2). All visits to homegardens and data collection were consented by the property owners under the term's acceptance of a prior and informed consent form.

To compare the composition of the homegardens with the native vegetation, we used data for forest areas from the Santa Catarina Forest Floristic Inventory (IFFSC) surveyed buffers within Itaiópolis municipality, all are belonging to late secondary successional stage. Each sample buffer had a fixed area in a conglomerate composed of four subunits with an area of 1000 m². We selected five sample buffers from the IFFSC database that correspond to the phytophysiognomy of the study area, and extracted from this database data on the richness and abundance of trees, arborescent plants, and palm trees. To characterize the composition and abundance of trees, arborescent plants and palms in the homegardens of the oldest neighborhood (A1), we used a plant inventory database in homegardens dated from 2014 (POLIZZO et al., 2014), and checked in a field visit in April 2019, when we added the measurements of DBH of each individual present in the homegardens (from the perimeter at breast height measured in the field). For the younger neighborhood (A2), all data was collected in April 2019. Our sampling effort aimed to collect the same amount of A2 homegardens using the census method likewise in A1. In each homegarden we registered the species composition and abundance, and measured DBH and height of each individual. We adopted the same criteria used in the inventory (POLIZZO et al., 2014) of A1 for species height (inclusion of species with at least 2 meters high, and height estimated using an approximation based on a known height reference).

To measure the approximate homegardens' size, we used satellite images available through Google Earth. The first author conducted taxonomic identification of the species present in the homegardens through detailed photos of the specimens found in homegardens, which were compared with voucher specimens (LUDWINSKY et al., 2020) and of (POLIZZO et al., 2014) on the studied areas. The nomenclature was checked with The Plant List (THE PLANT LIST, 2013). The REFLORA database (REFLORA, 2015) was used to check the origin of the plants (native or non-native). For this research, we did not consider native and non-native categories according to phytoregions due to the investigation of immigration contexts. Thus, we evaluate the native and non-native, considering those which are native to Brazil, according to REFLORA (2015).

5.3.3 Analysis

We evaluated the dissimilarities in the composition of species in both areas, through beta diversity with a presence/absence Jaccard matrix. We tested differences in average of dissimilarity in the beta diversity of species between groups with a Variance Analysis (ANOVA). To test the differences in averages of species' height, trunk diameter, abundance per area, and native and non-native species in homegardens, and homegardens' size, we used the Mann-Whitney-Wilcoxon test. We tested the correlation of homegarden's size and species richness through the Spearman correlation test. We used a proportional Venn diagram to show the shared and exclusive plants in each area. To estimate the number of species in the studied areas we used Chao-1 index with correction of bias (GOTELLI, 2009). We used a Chi-square to test the dependence in the number of native and non-native species in urban areas; and rarefaction curves to explore the composition of species observed between sampled areas. All statistical analyses were performed in *R* (R DEVELOPMENT CORE TEAM, 2018), with *vegan* (OKSANEN et al., 2018) and *betapart* packages to obtain beta diversity. We used Python's *matplotlib-venn* (TRETYAKOV, 2020) package to create the Venn diagrams.

5.4 RESULTS

The oldest homegardens were from "Alto Paraguaçu" (from now referred to as A1), and the younger homegardens were from "Vila Nova" (A2). Both areas are about 5.3km apart from each other. We collected data from 92 homegardens, of which 45 were located in A1 and 47 in A2. The families residing in A1 are descendants of Poles, many of whom already established their homes at the Lucena settlement. As for A2, we find residents of Polish descent and other ethnicities, such as Portuguese, Italians, and Germans. A1 homegardens are closer and contiguous to forest remnants, unlike A2 homegardens. We observed a dissimilarity in the composition of species between homegardens from A1 and homegardens from A2 (ANOVA F=10.234, p=0.02402). The average homegardens' size is different between areas (Wilcoxon W =7594, p-value =0.01971). Whereas for A1 the average size is 1000m² (σ=301.9), for A2 it is 564m² (σ=134.5). Although we observed a difference in homegarden's size and the dissimilarity of species composition present in these homegardens, we did not observe a correlation between homegarden's size and species richness (A1 Spearman correlation coefficient p = 0.09; A2 Spearman correlation coefficient p = 0.08).

We noticed that the arboreal, arborescent, and palm elements differ structurally when comparing A1 and A2. Plants in A1 are, on average, taller than plants in A2 (Wilcoxon W=9.587, p=0.00102), with approximated heights of 10-20m and 5-10m, respectively. Also, A1 has plants with larger mean Diameter Breast Height (DBH) than A2 (Wilcoxon W=11.953 p=0.00769). While A1 plants have 18cm mean DBH, A2 plants have only 8cm mean DBH.

Figures 17a and 17b show the abundance per species for A1 and A2, respectively. A1 has an average abundance per species of 9.24 (σ=16.59), while A2 has an average of 6.10

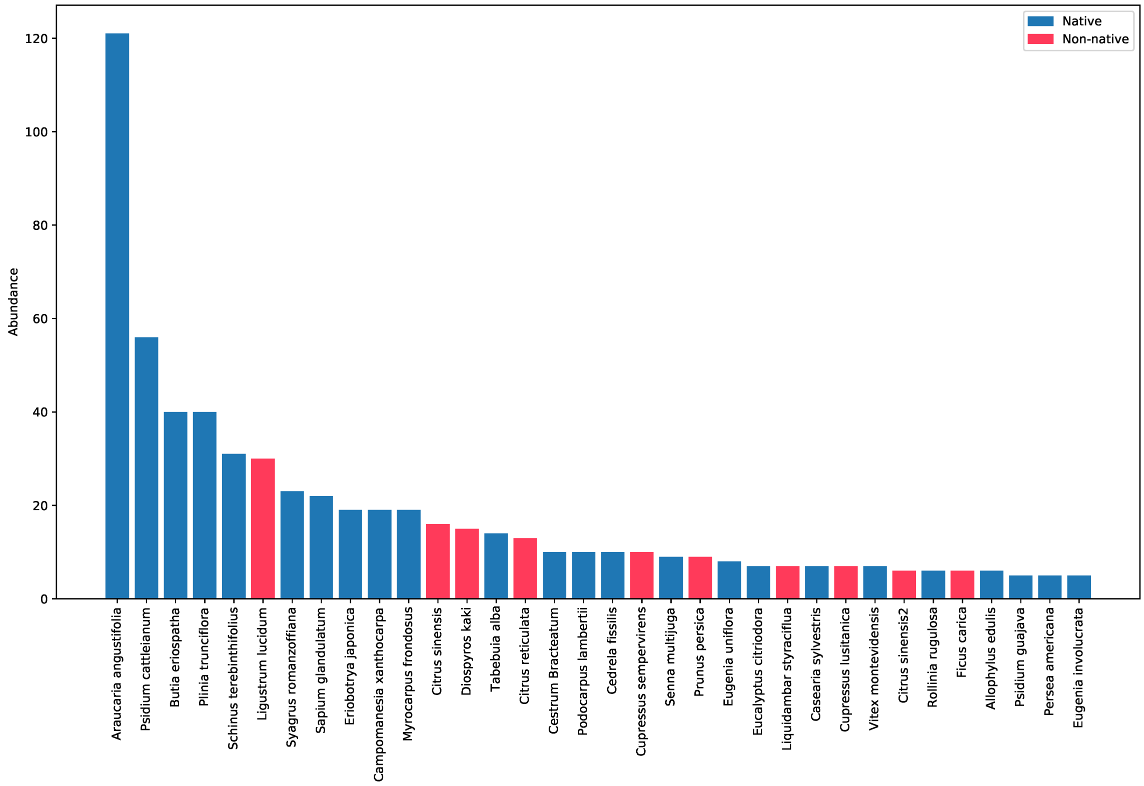
(σ=7.62). Therefore, there is a difference in abundance per species when comparing these areas (Wilcoxon W=7271, p-value=1.495e-08). The most abundant native species in A1 were *A. angustifolia*, *Psidium cattleianum*, *Butia eriospatha*, and *Schinus terebinthifolia*. The non-native species include *Plinia peruviana*, *Ligustrum lucidum*, *Eriobotrya japonica* and *Citrus sinensis*. As for A2, the most representative native species were *C. fissilis*, *Eugenia uniflora*, *Dicksonia sellowiana*, and *Handroanthus albus*. Among the non-native species, we found *C. sinensis*, *E. japonica*, *Roystonea oleracea*, and *L. lucidum*. The full list of species can be seen in the Appendix E. Figure 18 shows the abundance of species for the forest areas (data from IFFSC (2019)). The mean abundance per species is 9.34 (σ=20.49), and all species are native.

Figure 19 shows rarefaction curves (95% confidence interval) for the three studied areas and, for reference, the bias-corrected Chao1 estimates considering the whole samples. These curves show differences on the species richness in these areas, indicating the Forest as the richest one, even though its sampling only includes native species.

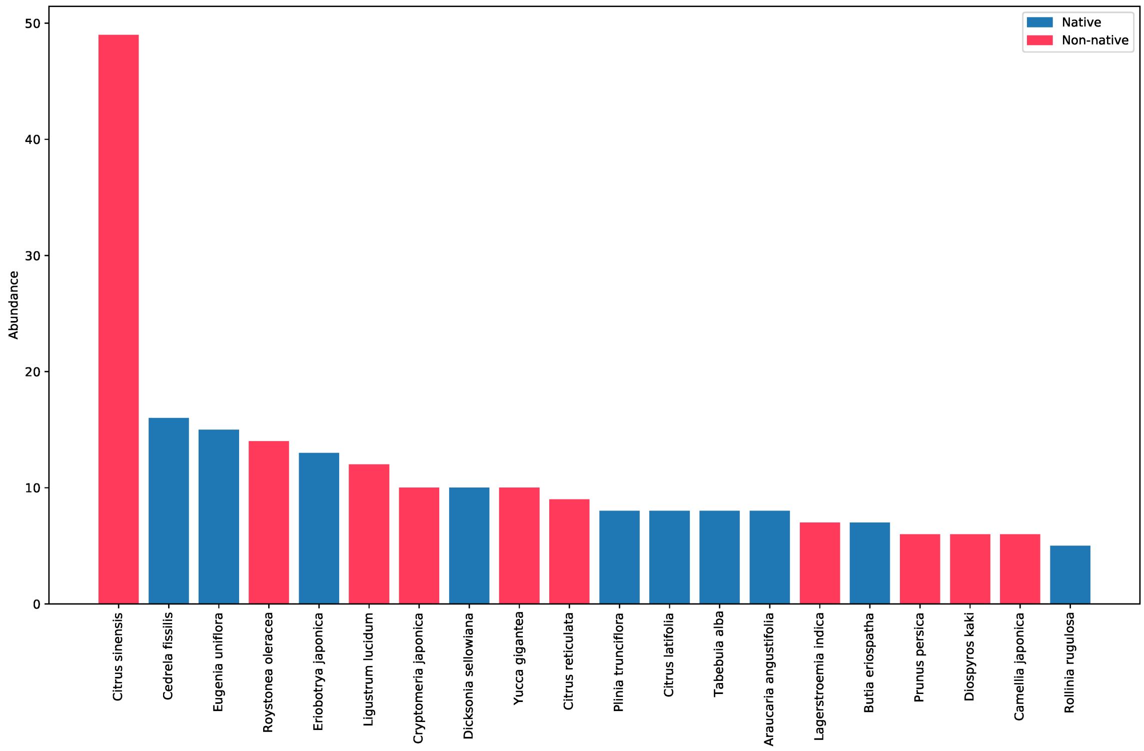
Considering only the homegardens, the species composition is different in A1 and A2 (Wilcoxon W=2103.5, p-value=1.883e-11), with A1 being the richer one with 75 species (mean=6.62, σ=5.69), while in A2 there is a total of 46 species (mean=4.38, σ=3.15). These two areas have 33 species in common (Figure 20a), of which 23 are native. Also, considering the bias-corrected Chao1 estimates, we found no evidence that the share of native and non-native plants depends on the homegarden's type – old or recent – (χ^2=0.91944, p-value = 0.3376).

Figure 20b shows a Venn diagram for native species, including the ones from Forest. Only six species are shared between both urban areas and the forest and seven exclusively with A1. Of the first three species with greater abundance in the forest (Figure 18), *Ilex paraguariensis*, *Ocotea porosa*, and *Araucaria angustifolia* are shared with A1, whereas *A. angustifolia* is shared with A2.

Figure 17 – Observed abundance of species in (a) A1 and (b) A2. We included all the species that where listed at least five times.



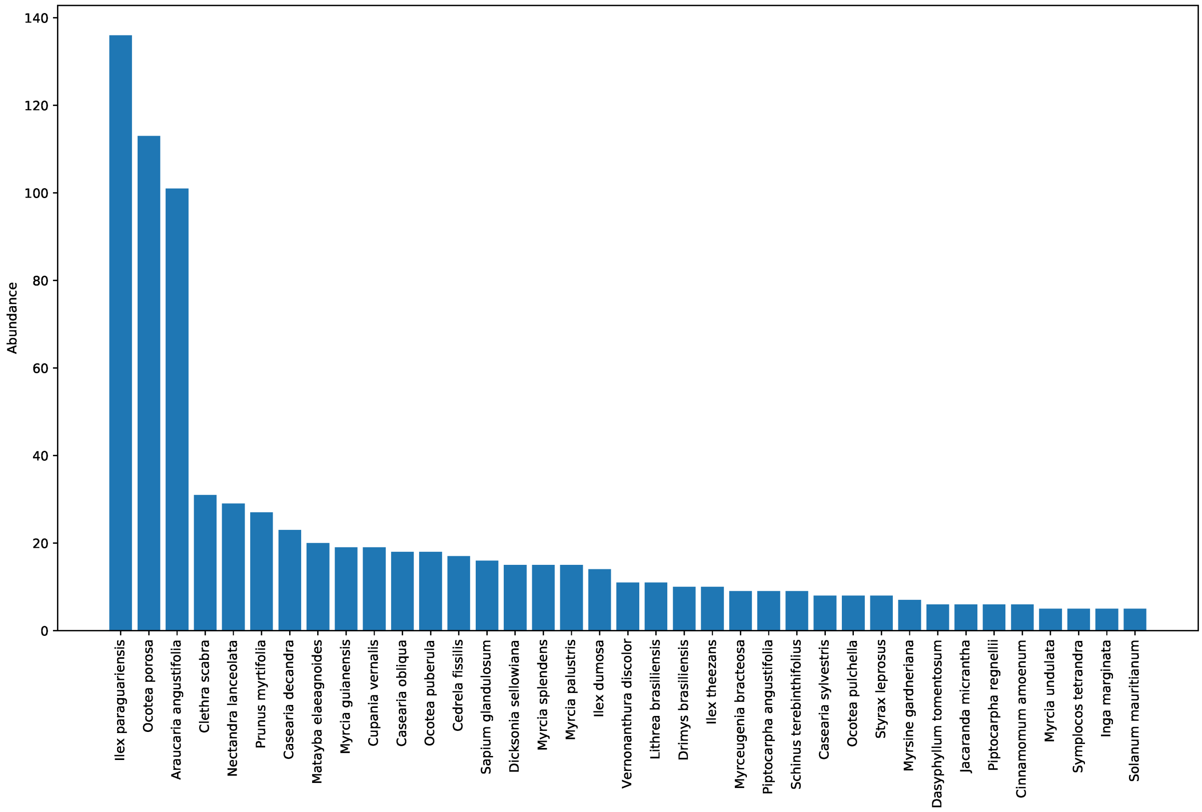
(a)



(b)

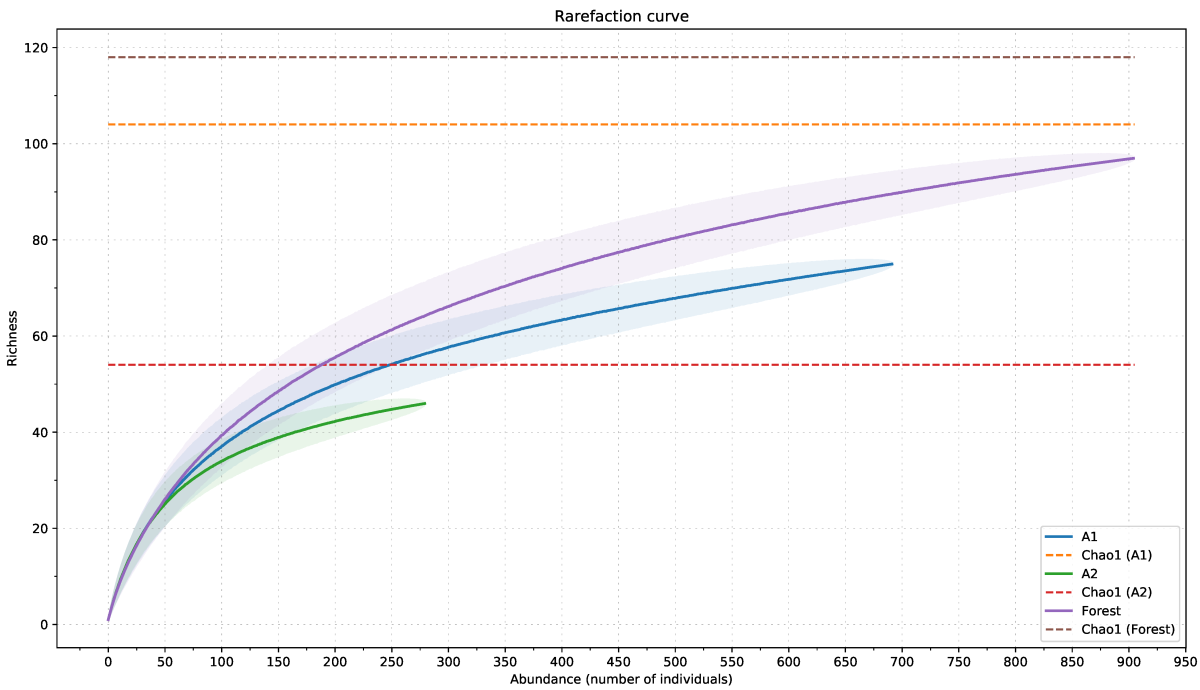
Source: Ludwinsky, R., H. 2021

Figure 18 – Observed abundance of native species in Forest areas.



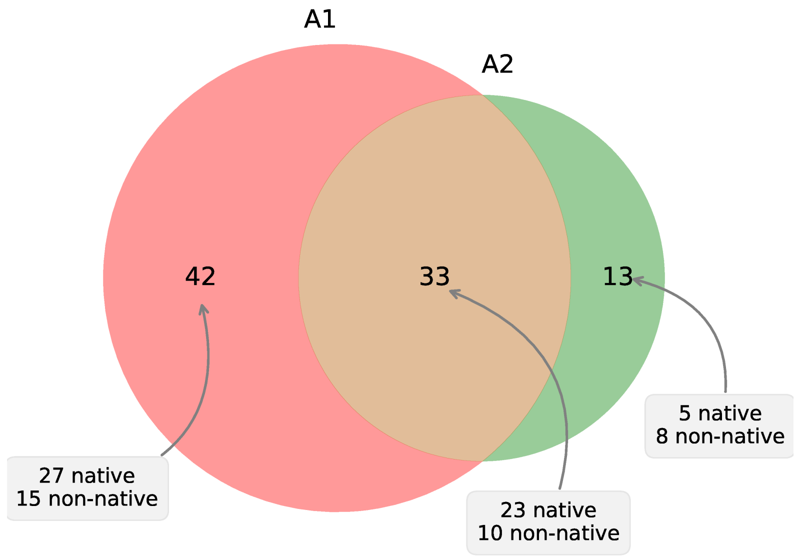
Source: Ludwinsky, R., H. 2021.

Figure 19 – Species rarefaction curves for each studied area. The dashed lines correspond to the bias-correct Chao1 index estimation of the whole sample. A1 and A2 contain both native and non-native species, while Forest contains native species only.

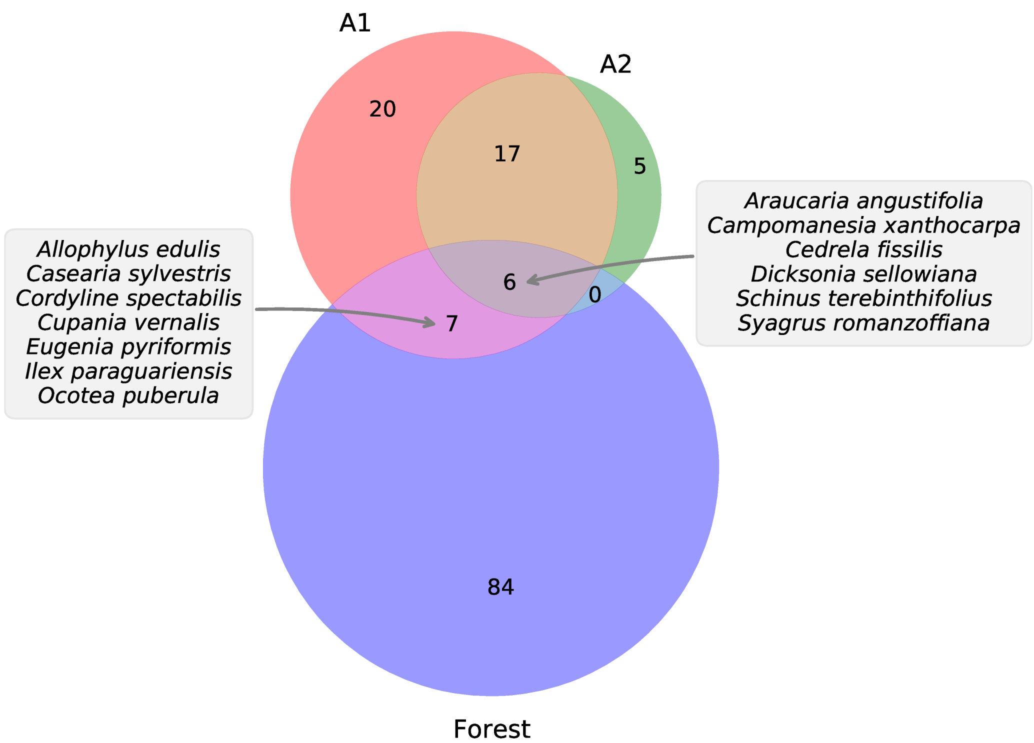


Source: Ludwinsky, R., H. 2021.

Figure 20 – Proportional Venn diagrams, where each circle's area is proportional to the sample's size, except for the intersection with size zero. (a) A1 and A2 (native and non-native). (b) Urban and Forest areas (only native species).



(a)



(b)

Source: Ludwinsky, R., H. 2021

5.5 DISCUSSION AND CONCLUSION

When comparing the areas of old and new homegardens, we do see species dissimilarities. Such data could indicate that the way people select species in homegardens, especially the elements of forest floras, reflects the accumulation of plants over the time. However, in this study we could not isolate the effect of the proximity of the forest patches between the older and younger homegardens, since the backyards of the A1 are contiguous or close to the forest areas. The data that supports our suggestion relies on the structural differences between individuals in A1 and A2, as well as the growing urbanization that modifies the local biodiversity since A2 is a newer area than A1. Additionally, the set of species found in both homegardens are composed of native species of economic importance, for example: *Eugenia uniflora*, *Dicksonia sellowiana*, and *Araucaria angustifolia*. *Eugenia uniflora* is a tree appreciated for its fruits, while *D. sellowiana* is an arborescent specie with ornamental appeal both for the whole individual and its trunk that can be used as a vase for flowers. In the latter case, there is a protection measure for this species due to intense exploitation that decreased *D. sellowiana* populations that brought it as an endangered species (see Brazilian National Environment Council resolution n. 317/2002). In the case of araucaria – *A. angustifolia*, its use is historically reported both by its seeds' food value and by the use of its wood (CARVALHO, 2017). In recent areas, we expect people to choose food resources to compose the most accessible areas, as homegardens, since such resources are indispensable for survival.

Many studies show the importance of araucaria trees and araucaria forest, from its influence in the landscape by native peoples to historical records of its exploitation (REIS et al., 2014; MELLO; PERONI, 2015; CARVALHO, 2017). Moreover, the intrinsic characteristic of the araucaria facilitates the occurrence of other species from the mixed ombrophilous Forest. Facilitation is a mechanism that contributes to the maintenance of biodiversity through direct and indirect changes in the environment, from the increasing nutrient availability in the soil, the hydraulic lift by the roots to the dispersion, and herbivorous mediations (CALLAWAY, 2007). Because of that, facilitator species create conditions that increase species composition due to the reduction of stressors. Araucaria creates favorable conditions for the establishment of other forest species typical of the mixed ombrophilous Forest (SILVA DUARTE et al., 2009; SÜHS et al., 2018), such as in the case of yerba mate – *Ilex paraguariensis*, which according to Klein (1972), is a species absent in forests with araucaria. In particular, yerba mate is the species with the greatest abundance in A1 homegardens. Other species associated with araucaria forests are *Ocotea porosa*, *Cedrela fissilis*, and species from Myrtaceae botanical family. Therefore, besides the pressure of the human selection on species, such facilitation characteristics may explain richness and abundance in A1 due to the higher number of individuals of araucaria in homegarderns.

Nevertheless, it is essential to highlight that other factors may influence the species richness and abundance in the areas. For example, native trees are protected by law, and environmental agencies highly supervise their management, such as the commerce of pine seeds or the extraction of timber from private properties (See Decree n. 6660/2008. Such decree regulates provisions of Law no. 11,428/2006 on the use and protection of native vegetation in the Atlantic Forest Biome in Brazil). Another factor influencing species' occurrence is the Traditional Ecological Knowledge - TEK of Polish descendants in the region. Itaiópolis is an area known for caívas' management, which are landscape units in which there is native yerba mate extraction integrated with animal production (HANISCH et al., 2010; MELLO; PERONI, 2015). For many families, the exploitation of yerba mate has always been an economic safeguard, and it was not different for Polish immigrants. Neighboring municipalities, such as São Bento do Sul initially had their economy largely dependent on yerba mate exploitation (KORMANN, 1980). In Itaiópolis, it is still possible to find old ranches where the yerba mate was processed. According to Smith (2012), cultural niches change the environment in such a way as to favor culture further. In other words, the modification of landscapes and the selection of natural resources by Polish immigrants would modify the landscape in such a way as to favor Polish culture, within this new context of the flora of the northern plateau of Santa Catarina. In its diverse historical socioeconomic contexts, the landscape management created conditions that promoted positive feedback for the region's phytophysiognomy. Such evidence can be seen in the composition of native species found in the forest and homegardens. In homegardens, in particular, cultural niche can be observed through the native species present in both areas and the representative abundance of native species in older areas. Such species that have a close relationship with the uses and practices of the time the settlements were formed.

Concerning the limitations of our work, all the older homegardens are contiguous or close to forest areas to the homegardens of the recent area, which is in the center of the city. Therefore, it was not possible to isolate the proximity variable with the forest. In addition, the proximity to the forest is not necessarily about the sample points of the IFFSC, but with other forest remnants across the landscape. Besides, the IFFSC sampling areas are composed of native species, so we could not compare non-native species from homegardens and the forest or investigate non-native invasive species' effects.

Such limitations did not prevent the investigation of the hypotheses but limited the exploration of variables. In conclusion, we observe that even after more than 100 years of Polish immigration, we can see historical and cultural elements that reflects the cultural niche through immigrants up to their descendants in homegardens.

6 CONSIDERAÇÕES FINAIS

Através dos três artigos apresentados nesta tese percebemos que há uma tendência de perda de conhecimento de plantas entre as gerações mais novas, além de uma adaptação de ingredientes e sabores na alimentação entendida como tradicional polonesa. Tal adaptação ocorre com a utilização de recursos nativos e disponíveis próximos aos descendentes. É fundamental ressaltar que o Conhecimento Ecológico Tradicional e suas memórias, sejam estes conhecimento e memórias pessoais ou de um grupo, são um fenômeno construído e reconstituído com o tempo. Então, ao acessarmos os saberes sobre plantas, por exemplo, era comum ouvir dos colaboradores da pesquisa memórias ligadas aos antepassados e plantas, porém os detalhes relacionados as plantas (como o nome da planta ou para que ela era útil) não ficavam claros. Notamos que os colaboradores identificavam uma ligação entre a etnia polonesa e plantas, sobretudo no que se refere a alimentação tradicional, o que é motivo de orgulho e de atração em festas étnicas locais. Porém, no município de São Bento do Sul nós percebemos que os recursos utilizados não são muito diferentes dos utilizados pela etnia alemã. Inclusive, ambas as etnias de descendentes compartilham nomes tradicionais de alimentos, tais quais “chucrute” (conserva de repolho azedo) e “crem” (conserva de raiz forte). Por um lado, pensando no aspecto do recurso vegetal disponível nos mercados e vendas locais, há uma relação com o próprio contexto socioeconômico da região. Por outro lado, existe um plano de fundo histórico no qual os imigrantes e descendentes precisavam se comunicar em alemão para conseguir vender seus produtos para clientes de etnia alemã. Ademais, registros dos anais da comunidade brasileiro-polonesa, como os de Wielewski (1901) mostram que a firma de colonização “Hansa” de São Bento do Sul e Blumenau tinha como proposta a “germanização” das áreas ondem eram destinados os imigrantes. Nos relatos de Wielewski (1901) o projeto de germanização chegou inclusive a proibir a construção de escolas polonesas (de maneira a diminuir o contato com o idioma polonês), bem como a venda de lotes para imigrantes poloneses na cidade de “Humbolt” (atual Corupá-SC). Como o Conhecimento Ecológico Tradicional está constantemente em transformações, notamos que com relação aos marcadores culturais alimentares, apesar de existirem conhecimentos de recursos e comidas tradicionais sobrepostas, a forma como os grupos étnicos de descendentes prepara os alimentos difere e está ligada a essa identidade étnica. Tais resultados evidenciam sobre a importância de olhar as negociações bioculturais ao longo das gerações de descendentes, no sentido de refletir sobre as mudanças e manutenções de práticas e saberes tradicionais, bem como sobre o incremento de plantas nos ambientes.

Ainda segundo Wielewski (1901) a colônia de Lucena, atual Itaiópolis, era local de resistência às mudanças impostas pela “germanização”, o que pode ser devido ao grande número de imigrantes poloneses presentes na localidade. A presença da imigração polonesa em Itaiópolis pode ser observada no interior e em bairros antigos especialmente o bairro de Alto Paraguaçú, que está tombado como patrimônio cultural. Em Itaiópolis, a paisagem é marcada pelo intenso histórico de agricultura e também de exploração madeireira, de erva-mate e pinhão pelos imigrantes. Notamos que atualmente, os quintais urbanos (enquanto unidades da paisagem historicamente manejadas) apresentam espécies arbóreas, arborescentes (como o xaxim) e palmeiras nativas constituindo tanto a composição de quintais antigos (como os de Alto Paraguaçú) e relativamente novos (como os do bairro Vila Nova). Uma diferença marcante entre os quintais antigos e novos é a abundância de algumas espécies nativas, principalmente da araucária que é mais abundante nos quintais de Alto Paraguaçú. Olhar a paisagem para entender a história das pessoas e das plantas é fundamental. Através da investigação das composições dos elementos arbóreos, arborescentes e das palmeiras presentes em quintais, percebemos evidências de uma manutenção de plantas que está ligada ao manejo do passado. O fato de a araucária ser uma espécie facilitadora, no sentido de que ela facilita a ocorrência de outras espécies de plantas, também contribui para a ocorrência e abundância de demais espécies associadas aos manejos antigos. Tal legado é transmitido através das memórias da imigração, dos conhecimentos associados as plantas, bem como dos quintais (principalmente no caso de quintais antigos que foram passados de pais para filhos).

Esperamos que os resultados desta tese possam contribuir para o entendimento de aspectos associados à imigração polonesa do planalto norte, bem como dos aspectos voltados aos Conhecimentos Ecológicos Tradicionais e manejo das plantas e paisagens por grupos migrantes, que adaptam seus conhecimentos em novos ambientes e continuamente ressignificam a sua identidade cultural. Ainda, esperamos que esta tese, através do olhar acadêmico, possa contribuir com as associações culturais, descendentes e interessados no resgate e manutenção de saberes étnicos locais. Ao longo deste trabalho pudemos participar de uma ação da Academia de Letras do Brasil na seccional de Rio Negrinho, no qual colaboramos com fotos e pequenos trechos escritos para uma amostra de imagens que contava a história da estrada Dona Francisca. Aproveitamos para contar um pouco sobre o histórico local de uso e manejo histórico da paisagem decorrentes das pesquisas desta tese (Figura 21). Com a concretização desta tese esperamos fortalecer ainda mais o vínculo com as associações e demais entidades interessadas para a realização de outras ações de compartilhamento de resultados desta pesquisa para os municípios participantes. Alguns tópicos que poderão ser desenvolvidos em ações de devolutivas nos municípios são:

Memórias culturais de plantas nativas podem ser grandes alicerces para gestão de cidades

- Pelo sentido de pertencimento ao local, memória, dos descendentes com o território e os recursos vegetais

- Sentido de pertencimento na gestão, conservação/preservação de áreas e recursos vegetais da cidade

Aprender entre as gerações

- Oficinas de aprendizado mútuo entre as gerações pra relembrar e transmitir conhecimentos

- Engajamento das associações culturais: concurso de contos, histórias familiares, feira de troca de plantas (em especial das nativas)

Finalizamos esta tese na certeza de que ainda temos muito trabalho pela frente e muitas investigações para realizar. Nossas experiências em campo nos permitiram fazer reflexões que vão muito além da pesquisa relacionada aos saberes de uma etnia, de plantas e paisagens. Incluem também saberes tradicionais e manejos da paisagem que são frutos de negociações biculturais e contextos socioeconômicos ao longo do tempo. O Brasil é um país multicultural e biodiverso, no qual as pessoas têm uma grande bagagem de influências e de memórias. Com isto, este trabalho não teve o intuito de dizer o que é certo ou errado entre descendentes, senão o intuito de refletir sobre os saberes, práticas e contextos etnoecológicos do brasileiro no planalto norte de Santa Catarina.

Figura 21 – Primeira caminhada Eco Cultural Em Rio Negrinho. Na imagem um cordão que percorria parte de um trecho na antiga Estrada Dona Franscica. As imagens e os pequenos textos escritos contam um pouco do contexto histórico do uso e manejo da paisagem local na época da contrução da Estrada D. Franscisca.

Fonte: Academia de Letras do Brasil de Santa Catarina, Seccional Rio Negrinho, 2018.

REFERÊNCIAS

ALBUQUERQUE, Ulysses Paulino de. **Introdução à Etnobotânica**. 2. ed. Rio de Janeiro: Interciência, 2005.

ALBUQUERQUE, Ulysses Paulino de; GONÇALVES, P. H. S.; JÚNIOR, W. S. Ferreira; CHAVES, L. S.; S. OLIVEIRA, R. C. da; SILVA, T. L. L. da; SANTOS, G. C. dos; L. ARAÚJO, E. de. Humans as niche constructors: Revisiting the concept of chronic anthropogenic disturbances in ecology. **Perspectives in Ecology and Conservation**, v. 16, p. 1–11, 2018. DOI: 10.1016/j.pecon.2017.08.006.

ALBUQUERQUE, Ulysses Paulino de; JÚNIOR, Washington Soares Ferreira; SANTORO, Flávia Rosa; TORREZ-AVILEZ, Wendy Marisol; JÚNIOR, José Ribamar Sousa. Niche Construction Theory and Ethnobiology. In: EVOLUTIONARY Ethnobiology. Recife: Springer, 2015. cap. 6, p. 73–87.

ALBUQUERQUE, Ulysses Paulino de; LUCENA, Reinaldo Farias Paiva de. **Métodos e técnicas na pesquisa etnobotânica**. Recife: LivroRápido/NUPEEA, 2004.

ALBUQUERQUE, Ulysses Paulino de et al. Ten important questions/issues for ethnobotanical research. **Acta Botanica Brasilica**, v. 33, p. 376–385, 2019. DOI: 10.1590/0102-33062018abb0331.

ALESC. **Um pouco da história da Polônia veio de navio para o Brasil**. [S.l.: s.n.], 2009. 02 jun 2021. Disponível em: <http://agenciaal.alesc.sc.gov.br/index.php/noticia_single/um-pouco-da-historia-da-polonia-veio-de-navio-para-o-brasil>.

ALEXIADES, Miguel N. Ethnobotany in the third millennium: expectations and unresolved issues. **Delpinoa**, v. 45, p. 15–28, 2005.

________. **Selected guidelines for ethnobotanical research: A field manual**. New York: The New York Botanical Garden, 1996.

ANDEL, Tinde van; WESTERS, Paul. Why Surinamese migrants in the Netherlands continue to use medicinal herbs from their home country. **Journal of Ethnopharmacology**, v. 127, p. 694–701, 2010.

ANDERSON, E.N. **Everyone Eats: Understanding Food and Culture**. [S.l.]: NYU Press, 2005. ISBN 9780814704967. Disponível em: <https://books.google.com.br/books?id=3xWt%5C_kWk6L8C>.

ASWANI, S.; LEMAHIEU, A.; SAUER, W. H. H. Global trends of local ecological knowledge and future implications. **PloS One**, 2018. DOI: doi.org/10.1371/journal.pone.0195440.

ÁVILA, Julia Vieira da Cunha; MELLO, Anderson Santos de; BERETTA, Mariane Elis; TREVISAN, Rafael; FIASCHI, Pedro; HANAZAKI, Natalia. Agrobiodiversity and in situ conservation in quilombola home gardens with different intensities of urbanization. **Acta Botanica Brasilica**, n. 31, p. 1–10, 2017.

AYANTUNDE, A. A.; BRIEJER, M.; HIERNAUX, P.; UDO, H. M. J.; TABO, R. Botanical knowledge and its differentiation by age, gender and ethnicity in southwestern Niger. **Human Ecology**, 2008. DOI: 10.1007/s10745-008-9200-7.

BALÉE, William. **Advances in Historical ecology: Premises and postulates.** New York: Columbia University Press, 1998.

________. The Research Program of Historical Ecology. **American Anthropologist**, v. 35, p. 75–98, 2006.

BARBETTA, P.A. **Estatística aplicada às Ciências Sociais**. [S.l.]: Editora da UFSC, 2017. (Série Didática).

BASELGA, A. Partitioning the turnover and nestedness components of beta diversity. **Global Ecology and Biogeography**, v. 19, p. 134–143, 2010.

BASELGA, A; ORME, C D L. betapart: an R package for the study of beta diversity. **Methods in Ecology and Evolution**, v. 3, p. 808–812, 2012.

BENNETT, Bradley C.; PRANCE, Ghillean T. Introduced plants in the indigenous Pharmacopoeia of Northern South America. **Economic Botany**, v. 54, p. 90–102, 2000.

BENTHIEN, Muriélle Silveira Boeira. **POLONESES DA COLÔNIA SÃO BENTO (1870-1930).** Dissertação (Mestrado em História) - Universidade Federal de Santa Catarina. Florianópolis, 2005.

BERKES, F. **Sacred Ecology: Traditional Ecological Knowledge and Resource Management**. [S.l.]: Taylor & Francis, 1999. (Sacred Ecology: Traditional Ecological Knowledge and Resource Management). ISBN 9781560326946. Disponível em: <https://books.google.com.br/books?id=5b8RAgZtxxIC>.

BERKES, Fikret; COLDING, Johan; FOLKE, Carl. REDISCOVERY OF TRADITIONAL ECOLOGICAL KNOWLEDGE AS ADAPTIVE MANAGEMENT. **Ecologycal applications**, v. 10, p. 1251–1262, 2000.

BERNARD, Harvey Russell; RYAN, Gery W. **Analyzing Qualitative Data: Systematic Approaches**. [S.l.]: Sage Publication, 2010.

BROWN, J. Expressions of diasporic belonging: The divergent emotional geographies of Britain's Polish communities. **Emotion, Space and Society**, v. 4, n. 4, p. 229–237, 2011.

BUSSMANN, R. W.; PANIAGUA-ZAMBRANA, N. Y.; WOOD, N.; NJAPIT, S. O.; NJAPIT, J. N. O.; OSOI, G. S. E.; KASOE, S. P. Knowledge loss and change between 2002 and 2017—A revisit of plant use of the Maasai of Sekenani Valley, Maasai Mara, Kenya. **Economic Botany**, v. 72, n. 207, 2018.

CALLAWAY, Ragan M. **Positive Interactions and Interdependence in Plant Communities**. Dordrecht: Springer, 2007.

CÁMARA-LERET, R; FORTUNA, M A; BASCOMPTE, J. Indigenous knowledge networks in the face of global change. **Proceedings of the National Academy of Sciences**, v. 116, p. 9913–9918, 2019.

CANIAGO, Izefri; STEPHEN, F. Siebert. Medicinal plant ecology, knowledge and conservation in Kalimantan, Indonesia. **Economic Botany**, v. 52, p. 229–250, 1998.

CAPALDI, Colin A.; DOPKO, Raelyne L.; ZELENSKI, John M. The relationship between nature connectedness and happiness: a meta-analysis. **Frontiers in Psychology**, 2014. DOI: doi: 10.3389/fpsyg.2014.00976.

CARNEIRO, Maria Gerlândia Rabelo; CAMURÇA, Andréa Machado; ESMERALDO, Gema Galgani Silveira Leite; SOUSA, Natália Ribeiro de. Quintais Produtivos: contribuição à segurança alimentar e ao desenvolvimento sustentável local na perspectiva da agricultura familiar (O caso do Assentamento Alegre, município de Quixeramobim/CE). **Revista Brasileira de Agroecologia**, v. 8, n. 2, p. 135–147, 2013.

CARVALHO, Miguel Mundstock Xavier de. O aumento da população humana (colonização e crescimento vegetativo) e os impactos sobre a floresta com arauária, séculos XIX e XX. In: HISTÓRIA ambiental e migrações: diálogos. Chapecó: Oikos, 2017. P. 139–156.

CAVALHIERI, Amanda E. **CONHECIMENTO E USO DE PLANTAS POR DESCENDENTES ALEMÃES EM SÃO BENTO DO SUL, SANTA CATARINA, BRASIL**. [S.l.: s.n.], 2018. POSTER apresentado durante o XVI Congresso da Sociedade Internacional de Etnobiologia. Belém do pará, Brasil.

CEUTERICK, M.; VANDEBROEK, I.; TORRY, T.; PIERONI, A. Cross-cultural adaptation in urban ethnobotany: The Colombian folk pharmacopoeia in London. **Journal of Ethnopharmacology**, v. 120, p. 342–59, 2008.

CEUTERICK, Melissa; VANDEBROEK, Ina. Identity in a medicine cabinet: Discursive positions of Andean migrants towards their use of herbal remedies in the United Kingdom. **Social Science and Medicine**, v. 177, p. 43–51, 2017.

CORADIN, L; SIMINSKI, A; REIS, A. **Espécies Nativas da Flora Brasileira de Valor Econômico Atual ou Potencial: Plantas para o Futuro – Região Sul**. [S.l.: s.n.], 2011. 15 jun 2017. Disponível em: <http://www.mma.gov.br/estruturas/sbf2008%5C_dcbio/%5C_ebooks/regiao%5C_sul/Regiao%5C_Sul.pdf>.

CRUZ, A. V. M.; KAPLAN, M. A. C. Uso Medicinal de Espécies das Famílias Myrtaceae e Melastomataceae no Brasil. **Floresta e Ambiente**, v. 11, n. 1, 2004.

CRUZ, Aline Pereira; GIEHL, Eduardo Luiz Hettwer; LEVIS, Carolina; MACHADO, Juliana Salles; BUENO, Lucas; PERONI, Nivaldo. Pre-colonialAmerindianlegaciesinforestcompositionofsouthernBrazi. **PlosOne**, v. 12, n. 7, 2020. DOI: 10.1371/journal.pone.0235819.

CUMMINS, Steven; MACINTYRE, Sally. "Food deserts"—evidence and assumption in health policy making. **Education and debate**, v. 325, p. 436–438, 2002.

DRAY, S.; DUFOUR., A. The ade4 package: Implementing the duality diagram for ecologists. **Journal of Statistical Software**, v. 22, n. 4, p. 1–20, 2007.

DUNN, C. P. Biological and cultural diversity in the context of botanic garden conservation strategies. **Plant Diversity**, v. 39, n. 6, p. 396–401, 2013.

DVORAK, Anna. **A Hidden Immigration: The Geography of Polish-Brazilian Cultural Identity**: Tese (Doutorado em Geografia) - University of California. California, 2013.

ELLWANGER, Amanda L.; LAMBERT, Joanna E. Investigating Niche Construction in Dynamic Human-Animal Landscapes: Bridging Ecological and Evolutionary Timescales. **International Journal of Primatology**, p. 1–20, 2017. DOI: 10.1007/s10764-018-0033-y.

EMMEZ, B C. Plants and foods as identity markers: an ethnographic analysis on the case of the (Y)Ezidis from Batman (Turkey). **Journal of Ethnic Foods**, v. 7, 2020. DOI: 10.1186/s42779-019-0038-y.

ERTEN, E.Y.; VAN DEN BERG, P.; WEISSING, F.J. Acculturation orientations affect the evolution of a multicultural Society. **Nature Communications**, 2018. DOI: 10.1038/s41467-017-02513-0.

FAETH, S. H.; WARREN, P. S.; SHOCHAT, E.; W.MARUSSICH. Trophic dynamics in urban communities. **BioScience**, v. 55, n. 5, p. 399–407, 2005.

FENDRICH, Henrique. **Quem eram os alemães de São Bento?** [S.l.: s.n.], 2017. Disponível em: <https://saobentonopassado.wordpress.com/2017/09/24/quem-eram-os-alemaes-de-sao-bento>.

FICKER, Carlos. **São Bento do Sul: subsídios para sua história**. Joinville: Impressora Ipiranga, 1973.

FONTEFRANCESCO, M. et al. Keeping or changing? Two different cultural adaptation strategies in the domestic use of home country food plant and herbal ingredients among Albanian and Moroccan migrants in Northwestern Italy. **Ethnobiology and Ethnomedicine**, v. 15, n. 11, 2019. DOI: 10.1186/s13002-019-0290-7.

FRANCO, Merlin; NARASIMHAN, D. Plants names and uses as indicators os knowledge patterns. **Indian Journal of Traditional Knowledge**, v. 8, p. 645–648, 2009.

FRIENDRICH, F. H; WITTER, N. A. Adaptação da culinária dos imigrantes Alemães (Rio Grande do Sul: 1850-1930. **Disciplinarum Scientia**, v. 13, 2012.

GASPER, André Luís et al. Inventário florístico florestal de Santa Catarina: espécies da Floresta Ombrófila Mista. **Rodriguésia**, v. 64, n. 2, p. 201–210, 2013.

GECK, M. S.; GARCÍA, A. J. Reyes; CASU, L.; LEONTI, M. Acculturation and ethnomedicine: A regional comparison of medicinal plant knowledge among the Zoque of southern Mexico. **Journal of Ethnopharmacology**, v. 187, n. 1, p. 146–159, 2016. DOI: 10.1186/1746-4269-10-1.

GEOGRAFIA E ESTATÍSTICA – IBGE, Instituto Brasileiro de. **Manual Técnico da Vegetação Brasileira**: Sistema fitogeográfico Inventário das formações florestais e campestres: técnicas e manejo de coleções botânicas Procedimentos para mapeamentos. Rio de Janeiro, 2019.

GERHARDT, M. Colonos ervateiros: História ambiental e imigração no Rio Grande do Sul. **Revista Esboços**, v. 18, n. 25, p. 73–95, 2011. DOI: 10.5007/2175-7976.2011v18n25p73.

GOTELLI, Nicholas J. **Ecologia**. Londrina: Editora Planta, 2009.

HANAZAKI, Natalia. Comunidades, conservação e manejo: o papel do conhecimento ecológico local. **Biotemas**, v. 16, p. 23–47, 2003.

HANISCH, Ana Lúcia; VOGT, Gilcimar Adriano; CUNHA MARQUES, Anésio da; BONA, Luís Cláudio; BOSSE, Daniel Darlon. Estrutura e composição florística de cinco áreas de caíva no Planalto Norte de Santa Catarina. **Pesquisa Florestal Brasileira**, v. 30, n. 64, p. 303–310, 2010.

HAPPEL, C. A. C. You are what you eat: Food as expression of social identity and intergroup relations in the colonial Andes. **Cincinnati Romance Review**, v. 33, p. 75–193, 2012.

HASELMAIR, R.; PIRKER, H.; KUHN, E.; VOGL, C. R. Personal networks: A tool for gaining insight into the transmission of knowledge about food and medicinal plants among Tyrolean (Austrian) migrants in Australia, Brazil and Peru. **Ethnobiology and Ethnomedicine**, v. 10, n. 1, 2014. DOI: 10.1186/1746-4269-10-1.

HAWKES, C. Uneven dietary development: linking the polices and progress of globalization with the nutrition transition, obesity and diet-related chronic diseases. **Global Health**, v. 2, p. 1–18, 2006.

HOLTZMAN, Jon D. Food and Memory. **Annual Review of Anthropology**, 2006. DOI: 10.1146/annurev.anthro.35.081705.123220.

HSIEH, T. C.; MA, K. H.; CHAO, A. **iNEXT: iNterpolation and EXTrapolation for species diversity. R package version 2.0.17.** [S.l.], 2018. Disponível em: <http://chao.stat.nthu.edu.tw/blog/software-download/.>.

HUBBELL, S. P. **The Unified Neutral Theory of Biodiversity and Biogeography.** Princeton: Princeton University Press, 2001.

HUNN, Eugene. Ethnobiology in four phases. **Journal of Ethnobiology**, v. 27, n. 1, p. 1–10, 2007.

IAROCHINSKI, Ulisses. **DZIEJE KOLONII W CRUZ MACHADO NA TLE POLSKIEJ EMIGRACJI W BRAZYLII NA PRZEŁOMIE XX WIEKU**: Tese (Doutorado em História) - Uniwersytet Jagiellonski. Kraków, 2009.

IBGE. **Santa Catarina, Itaiópolis - Síntese das Informações**. [S.l.: s.n.], 2010. 15 mar. 2016. Disponível em: <`http://goo.gl/9Meah7`>.

________. **Santa Catarina, São Bento - Síntese das Informações**. [S.l.: s.n.], 2010. 15 mar. 2016. Disponível em: <`http://goo.gl/jgdv1b`>.

________.________. [S.l.: s.n.], 2010. 15 mar. 2019. Disponível em: <`https://cidades.ibge.gov.br/brasil/sc/sao-bento-do-sul/panorama`>.

IFFSC. **Planilhas de dados do Invetário Florístico Florestal de Santa Catarina - IFFSC**. [S.l.], 2019.

JOHNSON, Lea R. et al. Conceptualizing social-ecological drivers of change in urban forest patches. **Journal of Urban Ecosystems**, 2020. DOI: 10.1007/s11252-020-00977-5.

JOST, Lou; DEVRIES, Philip; WALLA, Thomas; GREENEY, Harold; CHAO, Anne; RICOTTA, Carlo. Partitioning diversity for conservation analyses. **Diversity and Distributions**, v. 16, p. 65–76, 2010.

JURASINSKI, Gerald; RETZER, Vroni; BEIERKUHNLEIN, Carl. Inventory, differentiation, and proportional diversity: a consistent terminology for quantifying species diversity. **Oecologia**, 2008. DOI: 10.1007/s00442-008-1190-z.

KASZUBOWSKI, Aristeu. **Levantamento de descendentes de poloneses em São Bento do Sul baseado no número de sobrenomes em documentos de IPTU**. [S.l.: s.n.], 2015. 13 jun. 2016 – Informação concedida através de conversa informal.

KITTLER, P.G.; SUCHER, K.; NAHIKIAN-NELMS, Marcia. **Food and Culture**. 7th. Boston, MA, USA: Cengage Learning, 2016.

KLEIN, Roberto M.; REITZ, Raulino. **Mapa fitogeográfico do estado de Santa Catarina**. Itajaí: Herbário Barbosa Rodrigues, 1978.

KLEIN, Roberto Miguel. Árvores nativas da floresta subtropical do AIto Uruguai. **Sellowia, Itajaí**, v. 24, p. 1–17, 1972.

KORMANN, José. **Rio Negrinho que eu conheci**. Curitiba: Do autor, 1980.

KUHN, E.; HASELMAIR, R.; PIRKER, H.; VOG, C.R. The role of ethnic tourism in the foodknowledge tradition of Tyrolean migrants in Treze Tílias, SC, Brazil. **Journal of Ethnobiology and Ethnomedicine**, v. 14, n. 26, 2018. DOI: 10.1186/s13002-018-0224-9.

KUJAWSKA, Monika; HILGERT, N.; GIL, G.; KELLER, H. Medicinal plant diversity and inter-cultural interactions between indigenous Guarani, Criollos and Polish migrants in the subtropics of Argentina. **PLoS ONE**, v. 12, n. 1, 2017. DOI: 10.1371/journal.pone.0169373.

KUJAWSKA, Monika; ŁUCZAJ, Łukasz. Wild edible plants used by the Polish community in Misiones, Argentina. **Human Ecology**, v. 43, n. 6, 2015. DOI: 10.1007/s10745-015-9790-9.

KUJAWSKA, Monika; PIERONI, Andrea. Plants Used as Food and Medicine by Polish Migrants in Misiones, Argentina. **Ecology of Food and Nutrition**, v. 54, p. 1–25, 2015.

KUJAWSKA, Monika; ZAMUDIO, Fernando; MONTTI, Lía; CARRILLO, Veronica Piriz. Effects of Landscape Structure on Medicinal Plant Richness in Home Gardens: Evidence for the Environmental Scarcity Compensation Hypothesis. **Economic Botany**, n. 72, p. 150–165, 2018.

LADIO, Ana; LOZADA, M. Patterns of use and knowledge of wild edible plants in disting ecological environments: a case study of a Mapuche community fron northwestern Patagonia. **Biodiversity and Conservation**, v. 13, n. 6, p. 1153–1173, 2004.

LEIBOLD, M. A. et al. The metacommunity concept: a framework for multi-scale community ecology. **Ecology Letters**, n. 7, p. 601–613, 2004.

ŁUCZAJ, Ł.; PIERONI, A.; TARDÍO, J.; PARDO-DE-SANTAYANA, M.; SÕUKAND, R.; SVANBERG, I.; KALLE, R. Wild food plant use in 21st century Europe: the disappearance of old traditions and the search for new cuisines involving wild edibles. **Acta Societatis Botanicorum Poloniae**, v. 81, n. 4, p. 359–370, 2012.

LUDWINSKY, Rafaela Helena; HANAZAKI, Natalia; PERONI, Nivaldo. People and plants through generations of Polish descendants in Brazil. **Economic Botany**, v. 74, p. 319–329, 2020.

LUPTON, Deborah. Food, memory and meaning: the symbolic and social nature of food events. **The Sociological Review**, v. 42, n. 4, 1994. DOI: 10.1111/j.1467-954x.1994.tb00105.x.

MAGURRAN, Anne E. **Medindo a Diversidade Biológica**. Paraná: UFPR, 2013.

MALCZEWSKI, Zdzislaw. **Destacados poloneses e representantes da comunidade polônica no Brasil**. [S.l.: s.n.], 2000. Polônicus: Revista de reflexão Brasil – Polônia. 25 nov. 2015. Disponível em: <http://goo.gl/YuGrZT>.

MARCELLA, Anthony J.; RING, Ering. Immigration: An overview. In: MIGRATION: Immigration and Emigration in International Perspective. Westport: Praeger, 2003. P. 3–22.

MARQUES, José Geraldo Wanderley. **Pescando pescadores: ciência e etnociência em perspectiva ecológica**. 2. ed. São Paulo: NUPAUB-USP/Fundação Ford, 2001.

MATHEZ-STIEFEL, S. L.; VANDEBROEK., I. Distribution and transmission of medicinal plant knowledge in the Andean Highlands: A case study from Peru and Bolivia. **Evidence-based Complementary and Alternative Medicine**, v. 2012, p. 1–18, 2012.

MATTSSON, Eskil; OSTWALD, Madelene; NISSANKA, S. P.; MARAMBE, Buddhi. Homegardens as a Multi-functional Land-Use Strategy in Sri Lanka with Focus on Carbon Sequestration. **AMBIO**, v. 42, p. 892–902, 2013.

MEDEIROS, Patrícia Muniz; OLIVEIRA ABREU, Diego Batista de; ALBUQUERQUE, Ulisses Paulino de. Conhecimento e uso de plantas em contextos de migração. In: INTRODUÇÃO à Etnobiologia. Refice/PE: Nupeea, 2018. cap. 32, p. 275–279.

MEDEIROS, Patrícia Muniz; SOLDATI, Gustavo Taboada; ALENCAR, Nélson Leal; VANDEBROEK, Ina; PIERONI, Andrea; HANAZAKI, Natalia; ALBUQUERQUE, Ulysses Paulino de. The Use of Medicinal Plants by Migrant People: Adaptation, Maintenance, and Replacement. **Evidence-Based Complementary and Alternative Medicine**, v. 2012, p. 1–11, 2012.

MELLO, Anna Jacinta Machado; PERONI, Nivaldo. Cultural landscapes of the Araucaria Forests in the northern plateau of Santa Catarina, Brazil. **Journal of Ethnobiology and Ethnomedicine**, v. 11, n. 1, 2015. DOI: 10.1186/s13002-015-0039-x.

MILANESI, Lucas S.; PERONI, Nivaldo; REIS, Maurício Sedrez dos. Use of the palm Euterpe edulismartius in landscape units managed by migrants of German origin in Southern Brazil. **Journal of Ethnobiology and Ethnomedicine**, v. 9, n. 47, p. 1–11, 2013.

MÜLLER, J. G.; BOUBACAR, R.; GUIMBO, I. D. The "how" and "why" of including gender and age in ethnobotanical research and community-based resource management. **Ambio**, v. 44, n. 1, p. 67–78, 2014.

MYERS, Norman; MITTERMEIER, Russell A.; MITTERMEIER, Cristina G.; FONSECA, Gustavo A. B. da; KENT, Jennifer. Biodiversity hotspots for conservation priorities. **Nature**, v. 403, p. 853–858, 2000.

NAIR, P.K.R.; KUMAR, B.M. Introduction. In: TROPICAL homegardens: A time-tested example of sustainable agroforestry. Dordrecht: Springer, 2006. Introduction, p. 2.

ODLING-SMEE, John; ERWIN, Douglas H; PALKOVACS, Eric P; FELDMAN, Marcus W; LALAND, Kevin N. Niche construction theory: a practical guide for ecologists. **Quarterly Review of Biology**, v. 88, p. 3–28, 2013. DOI: 10.1086/659883.

ODLING-SMEE, John; LALAND, Kevin N.; FELDMAN, Marcus W. Niche construction: the neglected process in ecology. Monographs in Population Biology. **Monographs in Population Biology**, v. 37, princeton university press, 2003. DOI: Princeton.

OKSANEN, J. F. et al. **Vegan: Community Ecology Package R package version 2.5-3.** [S.l.], 2018. Disponível em: <https://CRAN.R-project.org/package=vegan.>.

PACYGA, D. A. Polish Diaspora. In: ENCYCLOPEDIA of diasporas: Immigrant and refugee cultures around the world. Boston: Springer, 2005. P. 254–263.

PALANISAMY, N.; NAUTIYAL, S.; K., Thiagarajan; CHANDRASEKARAN, R. Cross-cultural ethnobotany and conservation of medicinal and aromatic plants in the Nilgiris, Western Ghats: A case study. **International Journal of Phytomedicines and Related Industries**, v. 3, n. 1, p. 1–27, 2011.

PARADIS, E.; SCHLIEP, K. Ape 5.0: an environment for modern phylogenetics and evolutionary analyses in R. **Bioinformatics**, 2018. DOI: 10.1093/bioinformatics/bty633.

PARASECOLI, F. Food, Identity, and Cultural Reproduction in Immigrant Communities. **Social research**, v. 81, 2014. DOI: 10.1353/sor.2014.0015.

PASQUINI, M. W.; MENDOZA, J. S.; SÁNCHEZ OSPINA, C. Traditional food plant knowledge and use in three Afro-descendant communities in the Colombian Caribbean Coast: Part I. Generational Differences. **Economic Botany**, v. 72, n. 1, 2018. DOI: 10.1007/s12231-018-9422-6.

PERONI, Nivaldo; HANAZAKI, Natalia; BEGOSSI, Alpina; ZUCHIWSCHI, Elaine; LACERDA, Victoria Duarte; MIRANDA, Tatiana Mota. Homegardens in a micro-regional scale: contributions to agrobiodiversity conservation in an urban-rural context. **Ethnobiology and Conservation**, 2016. DOI: 10.15451/ec2016-8-5.6-1-17.

PIERONI, A.; VANDEBROEK, I. **Traveling cultures and plants: the ethnobiology and ethnopharmacy of human migrations**. New York: Berghahn, 2007.

PIERONI, Andrea; QUAVE, Cassandra L.; GIUSTI, Maria E.; PAPP, Nora. “We Are Italians!”: The Hybrid Ethnobotany of a Venetian Diaspora in Eastern Romania. **Journal of Human Ecology**, v. 40, p. 435–451, 2012. DOI: 10.1007/s10745-012-9493-4.

PIETRASZEK, B. The Poles in Brazil 1889–1910. **Polish American Studies**, v. 31, n. 2, p. 5–19, 1974.

PIRKER, Heidemarie; HASELMAIR, Ruth; KUHN, Elisabeth; SCHUNKO, Christoph; VOGL, Christian R. Transformation of traditional knowledge of medicinal plants: the case of Tyroleans (Austria) who migrated to Australia, Brazil and Peru. **Journal of ethnobiology and ethnomedicine**, v. 44, p. 1–26, 2012.

PODEROSO, Renata Andressa; HANAZAKI, Natalia; DUNAISKI, Antonio. How is local knowledge about plants distributed among residents near a protected area? **Ethnobiology and Conservation**, v. 18, n. 1, p. 1–26, 2012.

PODEROSO, Renata Andressa; HANAZAKI, Natalia; PERONI, Nivaldo. Gender Influences in the Perception and Use of the Landscape in a Rural Community of German Immigrant Descendants in Brazil. **BioOne**, v. 37, n. 4, p. 1–19, 2017.

POLIZZO, Auna Paula; ACYLINO, Fernando; MARTINS, Gustavo. **Inventário Botânico**: Auto Paraguaçú - Itaiópolis - Santa Catarina. Rio de Janeiro, 2014.

PRIMACK, R.B.; RODRIGUES, E. **Biologia da conservação**. [S.l.]: E. Rodrigues, 2001.

R DEVELOPMENT CORE TEAM. **R: A Language and Environment for Statistical Computing**. Vienna, Austria, 2018. ISBN 3-900051-07-0. Disponível em: <http://www.R-project.org>.

RAYOL, Breno Pinto; MIRANDA, Izildinha S. Quintais agroflorestais na Amazônia Central: caracterização, importância social e agrobiodiversidade. **Ciência Florestal**, v. 29, p. 1614–1629, 2020.

REFLORA. **REFLORA - Brazilian Plants: Historic Rescue and Virtual Herbarium for Knowledge and Conservation of the Brazilian Flora**. [S.l.: s.n.], 2015. 20 mar. 2016. Disponível em: <http://goo.gl/58A1VN>.

REIS, Maurício Sedrez dos; LADIO, Ana; PERONI, Nivaldo. Landscapes with Araucaria in South America: evidence for a cultural dimension. **Ecology and Society**, v. 19, n. 2, p. 1–14, 2014.

REITZ, Raulino; KLEIN, Roberto M.; REIS, Ademir. **Madeiras do Brasil**. Florianópolis: Lunardelli, 1979.

RODYCZ, Wilson Carlos. **Os imigrantes poloneses da Colônia Lucena – Itaiópolis – se um marreco pisar no gelo ele quebra..** Porto Alegre: Rodycz e Ordakowski, 2011.

SANTA CATARINA. **Atlas de Santa Catarina**. Rio de Janeiro: Aerofoto Cruzeiro, 1986. Gabinete de Planejamento e Coordenação.

SANTOS, S. A. Historical Roots of the “Whitening” of Brazil. **Latin American Perspectives**, v. 29, p. 61–82, 2002.

SCHWIRKOWSKI, Paulo. **Flora de São Bento do Sul - SC**. [S.l.: s.n.], 2021. Disponível em: <https://sites.google.com/site/florasbs/resultados-do-projeto>.

SHACKLETON, Charlie M.; HURLEY, Patrick T.; DAHLBERG, Annika C.; EMERY, Marla R.; NAGENDRA, Harini. Urban foraging: A ubiquitous human practice overlooked by urban planners, policy, and research. **Sustainability**, 2017. DOI: 10.3390/su9101884.

SILVA DUARTE, Leandro da; CARLUCCI, Marcos B.; PILLAR, Valério D. Macroecological analyses reveal historical factors influencing seed dispersal strategies in Brazilian *Araucaria* forests. **Global Ecology and Biogeography**, v. 18, p. 314–326, 2009.

SILVA A., T.; MAZINE F., F. A família Myrtaceae na Floresta Nacional de Ipanema, Iperó, São Paulo, Brasil. **Rodriguésia**, v. 67, 2016. DOI: 10.1590/2175-7860201667110.

SMITH, Bruce. A Cultural Niche Construction Theory of Inicial Domestication. **Biological Theory**, v. 6, p. 260–271, 2012.

SOGA, M.; GASTON, K. J. Extinction of experience: The loss of human–nature interactions. **Frontiers in Ecology and the Environment**, v. 14, n. 2, p. 94–101, 2016.

SOUSA, R.S.; HANAZAKI, N.; LOPES, J.B.; BARROS, R.F.M. Are Gender and Age Important in Understanding the Distribution of Local Botanical Knowledge in Fishing Communities of the Parnaíba Delta Environmental Protection Area? **Ethnobotany Research and Applications**, v. 10, n. 1, p. 551–559, 2012.

SÜHS, Rafael Barbizan; GIEHL, Eduardo Luís Hettwer; PERONI, Nivaldo. Interaction of land management and araucaria trees in the maintenance of landscape diversity in the highlands of southern Brazil. **PlosOne**, 2018. DOI: 10.1371/journal.pone.0206805.

TELEGINSKI N., M. Comeres, Memórias e Práticas: A Transmissão da Culinária Polonesa Entre Descendentes de Imigrantes no Centro-Sul do Paraná. Edição: ANPUH-São Paulo, 2014.

THE PLANT LIST. **The Plant List (2013). Version 1.1**. [S.l.: s.n.], 2013. Disponível em: <http://theplantlist.org/>.

TOWNSEND, C. R.; BEGON, M.; HARPER, J. L. **Fundamentos em Ecologia**. Segunda edição. Porto Alegre: Artmed, 2006.

TRES, Deysi Regina; REIS, Ademir; SCHLINDWEIN, Sandro Luis. A construção de cenários da relação homen-natureza sob uma perspectiva sistêmica para o estudo da paisagem em fazendas produtoras de madeira no planalto norte catarinense. **Ambiente e Sociedade**, v. 14, n. 1, p. 151–173, 2011.

TRETYAKOV, Konstantin. **matplotlib-venn**. [S.l.], 2020. Disponível em: <https://pypi.org/project/matplotlib-venn/>.

TURREIRA-GARCÍA, N.; VILKAMAA, A.M.; BYG, A.; THEILADE, I. Diversity, Knowledge, and use of leafy vegetables in Northern Thailand – maintenance and transmission of ethnobotanical knowledge during urbanization. **Natural History Bulletin of the Siam Society**, v. 62, p. 85–105, 2017.

UHLE, A. F.; GRIVETTI, L. E. Alpine and Brazilian Swiss food patterns after a century of isolation. **Ecology of Food and Nutrition**, v. 29, n. 2, p. 119–138, 1993.

UNITED NATIONS. **Revision of World Urbanization Prospects**. [S.l.: s.n.], 2010. 06 set. 2018. Disponível em: <https://goo.gl/Zd2B5y>.

VANDEBROEK, I.; BALICK, M. J. Globalization and loss of plant knowledge: Challenging the paradigm. **PLoS One**, v. 7, n. 5, 2012.

VETETO, J.; WELCH, K. A standard protocol for gathering palm ethnobotanical data and socioeconomic variables across the tropics. In: MEDICINAL plants and the legacy of R. E. Schultes, eds. St. Louis: Missouri Botanical Garden, 2012. P. 41–71.

________. Food from the ancestor: Documentation, conservation, and revival of eastern Cherokee heirloom plants. In: SEEDS of resistance, seeds of hope: Place and agency in the conservation of biodiversity. Tucson: The University of Arizona Press, 2013. P. 65–84.

VLKOVÁ, M.; KUBÁTOVÁ, E.; ŠLECHTA, P.; POLESNÝ, Z. TRADITIONAL USE OF PLANTS BY THE DISAPPEARING CZECH DIASPORA IN ROMANIAN BANAT. **Scientia Agriculturae Bohemica**, v. 46, p. 49–56, 2015. DOI: 10.1515/sab-2015-0016.

WIELEWSKI, Pawel. Sul do Paraná. Edição:
Superintendência das comemorações do centenário da imigração polonesa ao Paraná, 1901.

ZANK, S.; ARAUJO, L. G.; HANAZAKI, N. Resilience and adaptability of traditional healthcare systems: A case study of communities in two regions of Brazil. **Ecology and Society**, v. 24, n. 1, 2019.

Appendix

Apêndice A – QUESTIONÁRIO SEMIESTRUTURADO

PROTOCOLO DE ENTREVISTA

Dados da entrevista:

Local:____
____ Data:___/___/____ nº entrevista: ________

Entrevistadores: ____
Outras pessoas presentes durante a entrevista? S / N Quem?
____

Dados Pessoais do entrevistado:

1.Nome do entrevistado: ____
1.2Idade: ________anos 1.3Sexo: F / M
1.4É morador Nativo do município? S / N
*Registrar história de vida da pessoa ____
____
____
____
1.5Tempo que mora na região: _______________________1.6 Ocupação**___________________________
1.6.1 Já foi outra? S / N 1.6.2 Qual?____
1.6.3 Por que mudou?
____
1.7Escolaridade: ____
1.8Religião____
** Ex: Aposentadoria, Do lar, etc.

2.Qual a principal fonte de renda?
____
____
2.1Desde quando?____
2.2Já foi outra? S / N
2.3Qual?____
2.4Por que mudou?
____

3.Qual a sua descendência? __________________________________Qual sua geração? _______________
3.2 Qual a descendência dos seus pais? Mãe:______________________Pai:_____________________________
3.3Faz parte de algum grupo folclórico? S / N Qual? ____
3.4 Tem dupla cidadania? S / N
3.5 Fala polonês? S / N ____
3.6 Já esteve na Polônia? S / N Quantas vezes? Última visita? ___________________________________

4.Quais plantas você conhece? (Listagem livre)

Nº	Nome	Finalidade¹	Para que e como usa?	Parte usada²	Forma Obtenção³	Onde acha?⁴	Usa atualmente?	Coleta

Obs 1:
1 Med – medicinal; Mad – madeireiro; Ali – alimentício; Orn – ornamental; Rit – ritualístico; Fer – ferramenta, For – forrageira
2 Fol – folha; Flo – flor; Fru – fruto; Cau – caule; Cas – casca; Gal – galho, Sem – semente; Int – planta inteira
3 Cul – Cultvado; Ext – Extraído; Com – Comprado
4 Mat – mata; Qui – quintal; Cam – campos, pastos ou terrenos baldios; Mer – mercado

Obs 2: Sempre que possível perguntar se o colaborador conhece o nome da planta em polonês.

Apêndice B – TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO – TCLE

UNIVERSIDADE FEDERAL DE SANTA CATARINA - UFSC
CENTRO DE CIÊNCIAS BIOLÓGICAS
PROGRAMA DE PÓS-GRADUAÇÃO EM ECOLOGIA

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

O (a) senhor (a) está sendo convidado(a) a participar de uma pesquisa de doutorado, intitulada **"Mudanças na paisagem e papeis culturais de plantas: o contexto da migração polonesa no planalto norte catarinense"**, que fará entrevistas individuais com a comunidade descendente de imigrantes poloneses, tendo como objetivo entender como a imigração polonesa pode ter influenciado nas paisagens e nas plantas atualmente utilizadas em São Bento do Sul e Itaiópolis. O que queremos com este trabalho é entender como os imigrantes e descendentes contribuíram para moldar a paisagem e quais plantas são consideradas importantes culturalmente.

Para isso, faremos entrevistas que serão registradas de forma escrita e realizadas através de um questionário, o qual conterá duas partes. A primeira envolverá questões sócio-econômicas e a segunda será sobre o conhecimento de plantas. Serão realizadas, eventualmente, saídas para coleta de plantas com a ajuda de alguns moradores entrevistados. Pedimos permissão para tirar algumas fotos, tanto das plantas mostradas bem como da entrevista, sempre respeitando sua privacidade. Não é obrigatório participar da entrevista ou das coletas. Caso sinta-se desconfortável em participar da pesquisa, ou por qualquer outro motivo, a qualquer hora o (a) senhor (a) pode parar nossa conversa ou desistir de participar do trabalho, sem nenhum prejuízo pessoal.

Ao participar da pesquisa o (a) senhor (a) não terá nenhum risco além daqueles que você iria encontrar no seu dia-a-dia. A sua privacidade será mantida através da não-identificação do seu nome, mas sabemos que sempre existe algum risco de quebra de sigilo involuntária e não intencional. Desta forma, informamos que você terá direito a ser indenizado diante de eventuais danos decorrentes da pesquisa. Não há qualquer despesa para participação na pesquisa, ainda assim, informamos que caso haja algum custo eventual, o mesmo será ressarcido diante apresentação de comprovante fiscal. A pesquisa não possui nenhum objetivo financeiro e os resultados só serão usados para comunicar outros pesquisadores estudiosos do assunto e revistas relacionadas à universidade. Os benefícios e vantagens em participar deste estudo serão em curto prazo o resgate e a valorização de conhecimentos ecológicos e culturais, podendo resultar em longo prazo em ações que garantam a conservação da natureza e qualidade de vida aos moradores.

Sempre que desejar serão fornecidos esclarecimentos sobre cada uma das etapas da pesquisa através do contato com o pesquisador responsável especificado abaixo. As pessoas que estarão acompanhando os procedimentos serão a pesquisadora/doutoranda Rafaela Helena Ludwinsky e a professora orientadora Dra. Natalia Hanazaki. As informações resultantes da pesquisa serão analisadas no Laboratório de Ecologia Humana e Etnobotânica – LEHE da UFSC. Este termo de consentimento livre e esclarecido é feito em duas vias, sendo que uma delas ficará em poder do pesquisador e outra com o sujeito participante da pesquisa.

Agradecemos a sua participação.

Informações para contato

Rafaela Helena Ludwinsky
Fones: Laboratório: (48) 3721-9460, Rafaela: (47) 9960-6972 (Tim).
e-mail: rafaela.hbio@gmail.com
Laboratório de Ecologia Humana e Etnobotânica - LEHE, Universidade Federal de Santa Catarina - UFSC, Campus Universitário – Trindade - 88040-900 - Florianópolis – SC.
http://www.ecoh.ufsc.br/

O pesquisador responsável, que também assina esse documento, compromete-se a conduzir a pesquisa de acordo com o que preconiza a Resolução 466/12 de 12/06/2012, que trata dos preceitos éticos e da proteção aos participantes da pesquisa.

____

Rafaela Helena Ludwinsky

TERMO DE CONSENTIMENTO

Declaro que li (ou tive este documento lido para mim por uma pessoa de confiança) e fui informado sobre todos os procedimentos da pesquisa; que recebi de forma clara e objetiva todas as explicações pertinentes ao projeto; que todos os dados a meu respeito serão sigilosos e que fui informado (a) que posso me retirar do estudo a qualquer momento.

Nome por extenso
____

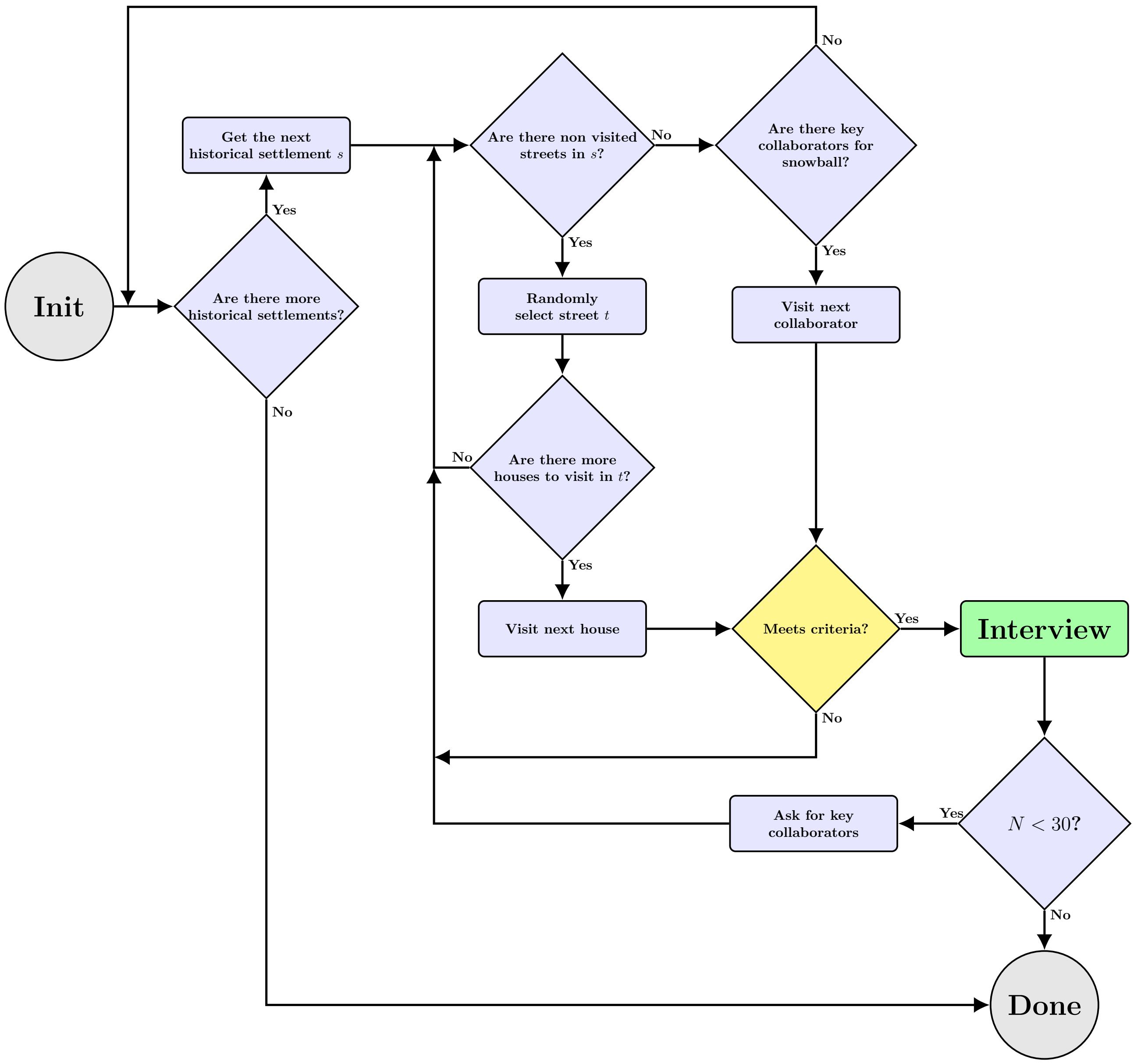
Assinatura ____

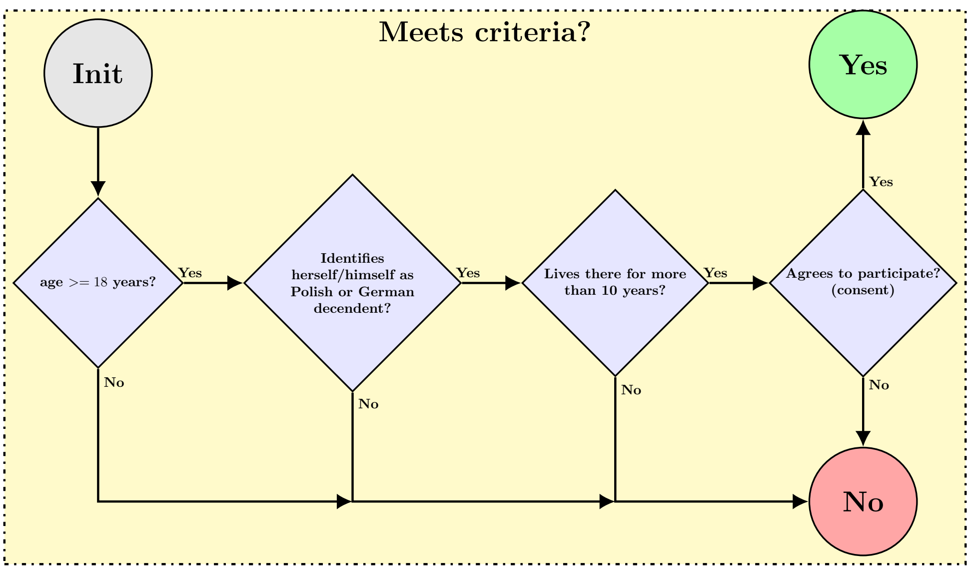
Local: ____ Data: ____/____/____ .

Você também poderá entrar em contato com o Comitê de Ética em Pesquisa com Seres Humanos da UFSC pelo telefone (48) 3721-6094, e-mail cep.propesq@contato.ufsc.br ou pessoalmente na rua Desembargador Vitor Lima, no 222, sala 401, Trindade, Florianópolis/SC CEP 88.040-400.

Apêndice C – ADDITIONAL FILE 1 – ARTIGO 2

Additional file 1: Flowchart illustrating the sampling of collaborators interviewed combining data from historical archives and snowball methods.





Apêndice D – ADDITIONAL FILE 2 – ARTIGO 2

Additional file 2: Plants recorded and identified during interviews. NA stands for Non-Available species identification because they were not present in Brazil, lack reproductive system, or because the material collected was damaged. Note that some species appear more than once in the table. That means this plant has known local varieties. For example, this occurs with kale and broccoli that are the same species but recognized as different by the interviewed collaborators. Although they are the same species, we considered the local varieties due to the different roles in dishes and food memories.

Botanical family	Species	Origin	Observation
Actinidiaceae	*Actinidia deliciosa* (A.Chev.) C.F.Liang & A.R.Ferguson	Non-native	
Aizoaceae	*Tetragonia tetragonioides* (Pall.) Kuntze	Non-native	
Amaranthaceae	*Beta vulgaris* L.	Non-native	
Amaranthaceae	*Chenopodium quinoa* Willd.	Non-native	
Amaryllidaceae	*Allium cepa* L.	Non-native	
Amaryllidaceae	*Allium fistulosum* L.	Non-native	
Amaryllidaceae	*Allium porrum* L.	Non-native	
Amaryllidaceae	*Allium sativum* L.	Non-native	
Anacardiacea	*Spondias purpurea* L.	Non-native	
Anacardiaceae	*Anacardium occidentale* L.	Native	
Anacardiaceae	*Mangifera indica* L.	Non-native	
Anacardiaceae	*Schinus terebinthifolia* Raddi	Native	
Annonaceae	*Annona muricata* L.	NA	
Annonaceae	*Annona squamosa* L.	Non-native	
Annonaceae	*Annona sylvatica* A.St.-Hil.	Native	
Anonaceae	*Annona* sp.	Non-native	Species identification not possible because lacking reproductive material.
Apiaceae	*Anethum graveolens* L.	Non-native	
Apiaceae	*Arracacia xanthorrhiza* Bancr.	Non-native	
Apiaceae	*Coriandrum sativum* L.	Non-native	
Apiaceae	*Cuminum cyminum* L.	Non-native	
Apiaceae	*Daucus carota* L.	Non-native	
Apiaceae	*Foeniculum vulgare* Mill.	Non-native	

Botanical family	Species	Origin	Observation
Apiaceae	*Petroselinum crispum* (Mill.) Fuss	Non-native	
Aquifoliaceae	*Ilex paraguariensis* A.St.-Hil.	Native	
Araceae	*Colocasia esculenta* (L.) Schott	Non-native	
Araceae	*Xanthosoma poecile* E.G.Gonç.	Native	
Araucariaceae	*Araucaria angustifolia* (Bertol.) Kuntze	Native	
Arecaceae	*Bactris gasipaes* Kunth	Non-native	
Arecaceae	*Butia catarinensis* Noblick & Lorenzi	Native	
Arecaceae	*Euterpe edulis* Mart.	Native	
Arecaceae	*Syagrus romanzoffiana* (Cham.) Glassman	Native	
Asparagaceae	*Asparagus officinalis* L.	Non-native	
Asteraceae	*Cichorium endívia* L.	Non-native	
Asteraceae	*Cynara scolymus* L.	Non-native	
Asteraceae	*Lactuca sativa* L.	Non-native	
Asteraceae	*Matricaria recutita* L.	Non-native	
Asteraceae	*Smallanthus sonchifolius* (Poepp.) H.Rob.	NA	
Asteraceae	*Stevia rebaudiana* (Bertoni) Bertoni	Non-native	
Brassicaceae	*Armoracia rusticana* P.Gaertn., B.Mey. & Scherb.	Non-native	
Brassicaceae	*Brassica oleracea* L.	NA	Kale
Brassicaceae	*Brassica oleracea* L.	NA	Broccoli
Brassicaceae	*Brassica oleracea* L.	Non-native	Cauliflower
Brassicaceae	*Brassica oleracea* L.	Non-native	Kohlrabi
Brassicaceae	*Brassica oleracea* L.	Non-native	Cabbage
Brassicaceae	*Eruca vesicaria* (L.) Cav.	Non-native	
Brassicaceae	*Raphanus raphanistrum* L.	Non-native	
Brassicaceae	*Rorippa nasturtium-aquaticum* (L.) Hayek	Non-native	

Botanical family	Species	Origin	Observation
Brassicaceae	*Sinapis alba* L.	Non-native	
Bromeliaceae	*Ananas comosus* (L.) Merr.	Non-native	
Bromeliaceae	*Ananas* sp.	Non-native	Species identification not possible because lacking reproductive material.
Cactaceae	*Pereskia aculeata* Mill.	Native	
Caricaceae	*Carica papaya* L.	Non-native	
Convolvulaceae	*Ipomoea batatas* (L.) Lam.	Native	
Cucurbitaceae	*Citrullus lanatus* (Thunb.) Matsum. & Nakai	Non-native	
Cucurbitaceae	*Cucumis melo* L.	Non-native	
Cucurbitaceae	*Cucumis sativus* L.	Non-native	
Cucurbitaceae	*Cucurbita maxima* Duchesne	Non-native	
Cucurbitaceae	*Cucurbita pepo* L.	Non-native	
Cucurbitaceae	*Sechium edule* (Jacq.) Sw.	Non-native	
Dioscoreaceae	*Dioscorea bulbifera* L.	Non-native	
Ebenaceae	*Diospyros kaki* L.f.	NA	
Euphorbiaceae	*Manihot esculenta* Crantz	Native	
Fabaceae	*Cicer arietinum* L.	Non-native	
Fabaceae	*Inga* sp.	NA	Known by the collaborators interviewed by the name “Ariticum”. Species identification not possible because lacking reproductive material.
Fabaceae	*Inga* sp.	Native	Known by the collaborators interviewed by the name “small ingá”. Species identification not possible because lacking reproductive material.
Fabaceae	*Phaseolus lunatus* L.	Non-native	
Fabaceae	*Phaseolus vulgaris* L.	Non-native	Black beans

Botanical family	Species	Origin	Observation
Fabaceae	*Phaseolus vulgaris* L.	Non-native	Known by the collaborators interviewed by the name "feijão de vagem" (green beans).
Fabaceae	*Pisum sativum* L.	Non-native	
Fabaceae	*Vigna unguiculata* (L.) Walp.	Native	
Fagaceae	*Castanea sativa* Mill.	NA	
Juglandaceae	*Juglans regia* L.	Non-native	
Lamiaceae	*Mentha* x *piperita* L.	Non-native	
Lamiaceae	*Mentha* x *rotundifolia* (L.) Huds.	Non-native	
Lamiaceae	*Ocimum basilicum* L.	Non-native	
Lamiaceae	*Ocimum* sp.	Non-native	Species identification not possible because lacking reproductive material.
Lamiaceae	*Origanum majorana* L.	Non-native	
Lamiaceae	*Origanum vulgare* L.	Non-native	
Lamiaceae	*Rosmarinus officinalis* L.	Non-native	
Lamiaceae	*Salvia officinalis* L.	Non-native	
Lamiaceae	*Thymus vulgaris* L.	Non-native	
Lauraceae	Cinnamomum zeylanicum Blume	Non-native	
Lauraceae	*Laurus nobilis* L.	Non-native	
Lauraceae	*Persea americana* Mill.	Non-native	
Lecythidaceae	*Bertholletia excelsa* Bonpl.	Native	
Lythraceae	*Punica granatum* L.	Non-native	
Malvaceae	*Abelmoschus esculentus* (L.) Moench	Non-native	
Malvaceae	*Theobroma cacao* L.	Non-native	
Marantaceae	*Maranta arundinacea* L.	Native	
Moracea	*Ficus carica* L.	Non-native	
Musaceae	*Musa* x *paradisiaca* L.	Non-native	
Myristicaceae	*Myristica fragrans* Houtt.	Non-native	

Botanical family	Species	Origin	Observation
Myrtaceae	*Campomanesia xanthocarpa* (Mart.) O.Berg	Native	
Myrtaceae	*Myrcianthes pungens* (O.Berg) D.Legrand	Native	
Myrtaceae	*Eugenia involucrata* DC.	Native	
Myrtaceae	*Eugenia pyriformis* Cambess.	Native	
Myrtaceae	*Myrcianthes pungens* (O.Berg) D.Legrand	Non-native	
Myrtaceae	*Pimenta dioica* (L.) Merr.	Non-native	
Myrtaceae	*Plinia trunciflora* (O.Berg) Kausel	Non-native	
Myrtaceae	*Psidium cattleyanum* Urb.	Native	
Myrtaceae	*Psidium guajava* L.	Non-native	Guava, Red Guava
Myrtaceae	*Psidium guajava* L.	Non-native	Guava, Yellow Guava
Myrtaceae	*Syzygium aromaticum* (L.) Merr. & L.M.Perry	Non-native	
Oleaceae	*Olea europaea* L.	Non-native	
Papaveraceae	*Papaver somniferum* L.	Non-native	
Passifloraceae	*Passiflora alata* Curtis	Non-native	
Passifloraceae	*Passiflora edulis* Sims	NA	
Piperaceae	*Piper nigrum* L.	Non-native	
Plantaginaceae	*Plantago major* L.	Native	
Poaceae	*Hordeum vulgare* L.	Non-native	
Poaceae	*Oryza sativa* L.	Non-native	
Poaceae	*Saccharum officinarum* L.	Non-native	
Poaceae	*Secale cereale* L.	Non-native	
Poaceae	*Triticum aestivum* L.	Non-native	
Poaceae	*Zea mays* L.	Non-native	
Polygonaceae	*Fagopyrum esculentum* Moench	Native	
Polygonaceae	*Rheum rhabarbarum* L.	Non-native	
Polygonaceae	*Rumex acetosa* L.	Non-native	

Botanical family	Species	Origin	Observation
Rhamnaceae	*Hovenia dulcis* Thunb.	NA	
Rosaceae	*Cydonia oblonga* Mill.	Non-native	
Rosaceae	*Eriobotrya japonica* (Thunb.) Lindl.	Non-native	
Rosaceae	*Fragaria vesca* L.	Non-native	
Rosaceae	*Malus domestica* Borkh.	Non-native	
Rosaceae	*Prunus avium* (L.) L.	Non-native	
Rosaceae	*Prunus domestica* L.	Non-native	
Rosaceae	*Prunus persica* (L.) Batsch	Non-native	
Rosaceae	*Pyrus communis* L.	Non-native	
Rosaceae	*Rubus fruticosus* L.	Non-native	
Rosaceae	*Rubus idaeus* L.	Non-native	
Rosaceae	*Rubus niveus* Thunb.	Non-native	
Rosaceae	*Rubus* sp.	Non-native	Species identification not possible because lacking reproductive material.
Rubiaceae	*Coffea arabica* L.	Non-native	
Rutaceae	*Citrus limon* (L.) Osbeck	Non-native	
Rutaceae	*Citrus reticulata* Blanco	Non-native	
Rutaceae	*Citrus sinensis* (L.) Osbeck	Non-native	
Sapindaceae	*Litchi chinensis* Sonn.	Non-native	
Solanaceae	*Cyphomandra betacea* (Cav.) Sendtn.	Non-native	
Solanaceae	*Physalis peruviana* L.	Non-native	
Solanaceae	*Solanum lycopersicum* L.	Non-native	
Solanaceae	*Solanum melongena* L.	Non-native	
Solanaceae	*Solanum tuberosum* L.	Non-native	
Theaceae	*Camellia sinensis* (L.) Kuntze	Non-native	
Verbenaceae	*Aloysia gratíssima* (Gillies & Hook.) Tronc.	NA	
Vitaceae	*Vitis vinifera* L.	Non-native	

Botanical family	Species	Origin	Observation
Zingiberaceae	*Curcuma longa* L.	Non-native	
Zingiberaceae	*Hedychium coronarium* J.Koenig	Non-native	
Zingiberaceae	*Zingiber officinale* Roscoe	Non-native	
NA	NA	NA	Specie identification was not possible due to the deterioration of the specimen collected during transportation to the laboratory. The plant was called “ervilha de árvore” (pea tree) by the collaborators interviewed.
NA	NA	Non-native	One of the collaborators interviewed visited Poland and had strong memories of a fruit they called *Malina*. It could be the *Rubus* genus, but We could not identify the species once the plant was not in Brasil.
NA	NA	Non-native	Similar to above, they called the fruit *Groszwinka*.
NA	NA	NA	Specie identification was not possible due to the deterioration of the specimen collected during transportation to the laboratory. The plant was called ”erva de Santa Maria” (St Marry’s herb) by the collaborators interviewed.
NA	NA	NA	The collaborators interviewed talked about foraging mushrooms for consumption. We did not find the mushrooms due to the inappropriate season for foraging such resources.

Apêndice E – ADDITIONAL FILE 1 – ARTIGO 3

Table 1: Species sampled between urban and forest areas

Species	**Family**	**A1**	**A2**	**Forest**
Acacia dealbata Link	Fabaceae		x	
Aegiphila integrifolia (Jacq.) B.D.Jacks.	Lamiaceae			x
Albizia edwallii (Hoehne) Barneby & J.W.Grimes	Fabaceae		x	
Alchornea glandulosa subsp. *iricurana* (Casar.) Secco	Euphorbiaceae	x		
Allophylus edulis (A.St.-Hil., A.Juss. & Cambess.) Radlk.	Sapindaceae	x		x
Annona emarginata (Schltdl.) H.Rainer	Annonaceae		x	
Araucaria angustifolia (Bertol.) Kuntze	Araucariaceae	x	x	x
Aspidosperma pyricollum Müll.Arg.	Apocynaceae	x		
Aspidosperma tomentosum Mart.	Apocynaceae			x
Bauhinia forficata Link	Fabaceae	x	x	
Butia eriospatha (Mart. ex Drude) Becc.	Arecaceae	x	x	
Cabralea canjerana (Vell.) Mart.	Meliaceae	x		x
Calliandra foliolosa Benth.	Fabaceae			x
Callistemon viminalis (Sol. ex Gaertn.) G.Don	Myrtaceae	x		
Calyptranthes concinna DC.	Myrtaceae			x
Camellia japonica L.	Theaceae	x	x	

Continues on the next page...

Species	**Family**	**A1**	**A2**	**Forest**
Campomanesia xanthocarpa (Mart.) O.Berg	Myrtaceae	x	x	x
Casearia decandra Jacq.	Salicaceae			x
Casearia obliqua Spreng.	Salicaceae			x
Casearia sylvestris Sw.	Salicaceae	x		x
Cedrela fissilis Vell.	Meliaceae	x		x
Cedrela odorata L.	Meliaceae	x	x	
Cestrum Bracteatum Link & Otto	Solanaceae	x		
Cestrum intermedium Sendtn.	Solanaceae			x
Cestrum nocturnum L.	Solanaceae		x	
Chamaecyparis obtusa (Siebold & Zucc.) Endl.	Cupressaceae	x		
Chamaecyparis pisifera (Siebold & Zucc.) Endl.	Cupressaceae	x		
Ceiba speciosa (A.St.-Hil.) Ravenna	Malvaceae	x		
Cinnamodendron dinisii Schwacke	Canellaceae			x
Cinnamomum amoenum (Nees & Mart.) Kosterm.	Lauraceae			x
Cinnamomum sellowianum (Nees & Mart.) Kosterm.	Lauraceae			x
Citrus aurantifolia (Christm.) Swingle	Rutaceae	x		
Citrus latifolia (Yu.Tanaka) Yu.Tanaka	Rutaceae	x		
Citrus limon (L.) Osbeck	Rutaceae	x	x	
Citrus reticulata Blanco	Rutaceae	x	x	

Continues on the next page...

Species	Family	A1	A2	Forest
Citrus sinensis (L.) Osbeck	Rutaceae	x		
Citrus sp.	x	x		
Clethra scabra Pers.	Clethraceae			x
Cocos nucifera L.	Arecaceae		x	
Cordia ecalyculata Vell.	Boraginaceae	x		
Cordia silvestris Fresen.	Boraginaceae			x
Cordyline congesta (Sweet) Steud.	Asparagaceae	x		x
Coussarea contracta (Walp.) Benth. & Hook.f. ex Müll.Arg.	Rubiaceae			x
Cryptomeria japonica (Thunb. ex L.f.) D.Don	Cupressaceae	x		
Cunninghamia lanceolata (Lamb.) Hook.	Cupressaceae	x		
Cupania vernalis Cambess.	Sapindaceae	x		x
Cupressus lusitanica Mill.	Cupressaceae	x	x	
Cupressus macrocarpa Hartw.	Cupressaceae	x	x	
Cupressus sempervirens L.	Cupressaceae	x		
Corymbia citriodora (Hook.) K.D.Hill & L.A.S.Johnson	Myrtaceae	x		
Dasyphyllum tomentosum (Spreng.) Cabrera	Asteraceae			x
Delonix regia (Hook.) Raf.	Fabaceae	x		
Dicksonia sellowiana Hook.	Dicksoniaceae	x	x	x
Diospyros kaki L.f.	Ebenaceae	x	x	
Drimys brasiliensis Miers	Winteraceae			x

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Species	**Family**	**A1**	**A2**	**Forest**
Eriobotrya japonica (Thunb.) Lindl.	Rosaceae	x	x	
Escallonia megapotamica Spreng.	Escalloniaceae			x
Eucalyptus cinerea F.Muell. ex Benth.	Myrtaceae	x	x	
Eugenia involucrata DC.	Myrtaceae	x	x	
Eugenia pluriflora DC.	Myrtaceae			x
Eugenia pyriformis Cambess.	Myrtaceae			x
Eugenia speciosa Cambess.	Myrtaceae			x
Eugenia uniflora L.	Myrtaceae	x	x	
Ficus sp.	x	x		
Ficus carica L.	Moraceae	x		
Ficus luschnathiana (Miq.) Miq.	Moraceae			x
Ginkgo biloba L.	Ginkgoaceae	x		
Gordonia fruticosa (Schrad.) H.Keng	Theaceae			x
Handroanthus albus (Cham.) Mattos	Bignoniaceae	x	x	
Hovenia dulcis Thunb.	Rhamnaceae	x	x	
Ilex brevicuspis Reissek	Aquifoliaceae			x
Ilex dumosa Reissek	Aquifoliaceae			x
Ilex microdonta Reissek	Aquifoliaceae			x
Ilex paraguariensis A.St.-Hil.	Aquifoliaceae			x
Ilex theezans Mart.	Aquifoliaceae			x
Inga edulis Mart.	Fabaceae	x		

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Species	Family	A1	A2	Forest
Inga semialata (Vell.) C.Mart.	Fabaceae			x
Jacaranda micrantha Cham.	Bignoniaceae			x
Jacaranda mimosifolia D.Don	Bignoniaceae	x		
Jacaranda puberula Cham.	Bignoniaceae			x
Lagerstroemia indica L.	Lythraceae	x	x	
Lamanonia ternata Vell.	Cunoniaceae			x
Laurus nobilis L.	Lauraceae		x	
Leptospermum scoparium J.R.Forst. & G.Forst.	Myrtaceae		x	
Ligustrum lucidum W.T.Aiton	Oleaceae	x	x	
Liquidambar styraciflua L.	Altingiaceae	x	x	
Lithraea brasiliensis Marchand	Anacardiaceae			x
Lonchocarpus campestris Benth.	Fabaceae	x		
Machaerium stipitatum (DC.) Vogel	Fabaceae			x
Malus X *domestica* Borkh.	Rosaceae	x		
Matayba elaeagnoides Radlk.	Sapindaceae			x
Matayba intermedia Radlk.	Sapindaceae			x
Maytenus evonymoides Reissek	Celastraceae			x
Melia azedarach L.	Meliaceae		x	
Mimosa scabrella Benth.	Fabaceae	x	x	
Morus nigra L.	Moraceae	x		
Myrceugenia sp.	Myrtaceae			x

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Species	Family	A1	A2	Forest
Myrceugenia bracteosa (DC.) D.Legrand & Kausel	Myrtaceae			x
Myrceugenia euosma (O.Berg) D.Legrand	Myrtaceae			x
Myrceugenia glaucescens (Cambess.) D.Legrand & Kausel	Myrtaceae			x
Myrceugenia myrcioides (Cambess.) O.Berg	Myrtaceae			x
Myrcia amazonica DC.	Myrtaceae			x
Myrcia guianensis (Aubl.) DC.	Myrtaceae			x
Myrcia hatschbachii D.Legrand	Myrtaceae	x		
Myrcia lajeana D.Legrand	Myrtaceae			x
Myrcia laruotteana Cambess.	Myrtaceae	x		
Myrcia palustris DC.	Myrtaceae			x
Myrcia splendens (Sw.) DC.	Myrtaceae			x
Myrcia undulata O.Berg	Myrtaceae			x
Myrciaria floribunda (H.West ex Willd.) O.Berg	Myrtaceae			x
Myrocarpus frondosus Allemao	Fabaceae	x		
Myrsine coriacea (Sw.) R.Br. ex Roem. & Schult.	Myrtaceae			x
Myrsine gardneriana A. DC.	Myrtaceae			x
Myrsine umbellata Mart.	Primulaceae			x
Nectandra lanceolata Nees & Mart.	Lauraceae			x

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Species	Family	A1	A2	Forest
Nectandra megapotamica (Spreng.) Mez	Lauraceae			x
Nectandra membranacea (Sw.) Griseb.	Lauraceae	x		
Nectandra oppositifolia Nees & Mart.	Lauraceae			x
Ocotea porosa (Nees & Mart.) Barroso	Lauraceae			x
Ocotea puberula (Rich.) Nees	Lauraceae	x		x
Ocotea pulchella (Nees & Mart.) Mez	Lauraceae			x
Opuntia ficus-indica (L.) Mill.	Cactaceae	x		
Pachira glabra Pasq.	Malvaceae		x	
Peltophorum dubium (Spreng.) Taub.	Fabaceae	x		
Persea americana Mill.	Lauraceae	x		
Persea major (Meisn.) L.E.Kopp	Lauraceae			x
Phoenix roebelenii O'Brien	Arecaceae	x		
Picramnia excelsa Kuhlm. ex Pirani	Picramniaceae			x
Pimenta pseudocaryophyllus (Gomes) Landrum	Myrtaceae			x
Pinus elliottii Engelm.	Pinaceae	x	x	
Piptocarpha sp.	Asteraceae			x
Piptocarpha angustifolia Dusén ex Malme	Asteraceae			x

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Species	Family	A1	A2	Forest
Piptocarpha axillaris (Less.) Baker	Asteraceae			x
Piptocarpha regnellii (Sch.Bip.) Cabrera	Asteraceae			x
Plinia peruviana (Poir.) Govaerts	Myrtaceae	x	x	
Podocarpus lambertii Klotzsch ex Endl.	Podocarpaceae	x		
Prunus armeniaca L.	Rosaceae	x		
Prunus campanulata Maxim.	Rosaceae	x		
Prunus myrtifolia (L.) Urb.	Rosaceae			x
Prunus persica (L.) Batsch	Rosaceae	x	x	
Psidium cattleianum Afzel. ex Sabine	Myrtaceae	x	x	
Psidium guajava L.	Myrtaceae	x	x	
Punica granatum L.	Lythraceae		x	
Pyrus bourgaeana Decne.	Rosaceae		x	
Rollinia rugulosa Schltdl.	Annonaceae	x	x	
Roupala montana Aubl.	Proteaceae			x
Roystonea oleracea (Jacq.) O.F.Cook	Arecaceae		x	
Salix babylonica L.	Salicaceae		x	
Sapium glandulatum (Vell.) Pax	Euphorbiaceae	x		
Sapium glandulosum (L.) Morong	Euphorbiaceae			x
Schefflera arboricola (Hayata) Merr.	Araliaceae		x	

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Species	Family	A1	A2	Forest
Schinus molle L.	Anacardiaceae	x	x	
Schinus terebinthifolia Raddi	Anacardiaceae	x	x	x
Sessea regnellii Taub.	Solanaceae			x
Sloanea guianensis (Aubl.) Benth.	Elaeocarpaceae			x
Sloanea hirsuta (Schott) Planch. ex Benth.	Elaeocarpaceae			x
Sloanea monosperma Vell.	Elaeocarpaceae	x		
Solanum betaceum Cav.	Solanaceae	x		
Solanum mauritianum Scop.	Solanaceae			x
Solanum paniculatum L.	Solanaceae	x		
Solanum sanctacatharinae Dunal	Solanaceae	x		
Styrax acuminatus Pohl	Styracaceae			x
Styrax leprosus Hook. & Arn.	Styracaceae			x
Syagrus romanzoffiana (Cham.) Glassman	Arecaceae	x	x	x
Symplocos tetrandra Mart.	Symplocaceae			x
Syzygium aromaticum (L.) Merr. & L.M.Perry	Myrtaceae	x		
Thuja occidentalis L.	Cupressaceae	x		
Tibouchina sellowiana sellowiana Cogn.	Melastomataceae	x	x	
Trachycarpus fortunei (Hook.) H.Wendl.	Arecaceae	x	x	
Trema micrantha (L.) Blume	Cannabaceae			x

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Species	**Family**	**A1**	**A2**	**Forest**
Vernonanthura discolor (Spreng.) H.Rob.	Asteraceae			x
Vitex megapotamica (Spreng.) Moldenke	Lamiaceae			x
Vitex montevidensis Cham.	Lamiaceae	x		
Xylosma pseudosalzmannii Sleumer	Salicaceae			x
Yucca gigantea Lem.	Asparagaceae	x	x	
Zanthoxylum fagara (L.) Sarg.	Rutaceae			x
Zanthoxylum kleinii (R.S. Cowan) P.G. Waterman	Rutaceae			x
Zanthoxylum rhoifolium Lam.	Rutaceae			x