

Sowing health: growing a medicinal garden in Primary Care, an experience report

Semeando saúde: o cultivo de um jardim medicinal na Atenção Básica em Saúde, um relato de experiência

Sembrando salud: el cultivo de un jardín medicinal en la atención primaria de salud, un relato de experiencia

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Abstract

Problem: Currently, the paradigm of health production is lavished by a myriad of commercial interests, gallant in the biomedical model that overestimates modern scientific knowledge. Even though they are discredited by scientific sovereignty, about 70% of the popular use of medicinal plants is scientifically confirmed and this non-institutional knowledge is common in everyday practices. According to data from the World Health Organization (WHO), 80% of the population in developing countries use traditional practices in primary health care and, of that total, 85% make use of medicinal plants. In Brazil, approximately 82% of Brazilians use herbal products to take care of their health. Before this mismatch, primary health care highlights as a strategic space to fertilize the terrain of herbal practices. **Methodology:** This is a descriptive, qualitative, experience report type study, on the development of a medicinal garden located in a Family Health Unit in the city of Recife, Pernambuco. A systematic record of activities was used by making a field diary with a photographic record, complemented by a bibliographical survey and documentary research. **Results:** The project passed through the Informational, Structural and Planting stages, gathering several types of knowledge based on the spirit of multiprofessionality and community participation. In the end, efforts culminated in the growth of a medicinal garden, providing a space for the exchange of learning and experiences. **Conclusion:** Can be concluded that the structuring of a medicinal garden in the scope of primary health care calls for a prodigious potential in strengthening the principles that guide this level of care, repositioning the user to the center of the care model and expanding the effective therapeutic options and low cost.

Keywords: Primary health care; Phytotherapy; Plants, medicinal; Gardens.

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Resumo

Problema: Atualmente, o paradigma da produção de saúde é prodigalizado por uma miríade de interesses mercantis galanteadores do modelo biomédico, que supervaloriza o conhecimento científico moderno. Mesmo que seja desprestigiado pela soberania científica, cerca de 70% do uso popular das plantas medicinais é confirmado cientificamente, e esses saberes não institucionais são frequentes nas práticas cotidianas. Segundo dados da Organização Mundial da Saúde (OMS), 80% da população de países em desenvolvimento utiliza-se de práticas tradicionais na atenção primária à saúde e, desse total, 85% fazem uso de plantas medicinais. No Brasil, 82% dos brasileiros usam produtos à base de plantas medicinais para cuidar da saúde. Perante este descompasso, a atenção primária à saúde destaca-se como espaço estratégico para adubar o terreno das práticas fitoterápicas. **Metodologia:** Trata-se de um estudo descritivo, qualitativo, do tipo relato de experiência, sobre o desenvolvimento de um jardim medicinal localizado numa Unidade de Saúde da Família do município de Recife, Pernambuco. Utilizou-se um registro sistemático das atividades por meio da confecção de um diário de campo com registro fotográfico, complementado por levantamento bibliográfico e pesquisa documental. **Resultados:** O projeto perpassou pelas etapas informacional, estrutural e de plantio, constelando vários saberes com base no espírito da multiprofissionalidade e da participação comunitária. Ao fim, os esforços culminaram na efetivação de um jardim medicinal, propiciando um espaço para a troca de conhecimentos e experiências. **Conclusão:** Conclui-se que a estruturação de um jardim medicinal no âmbito da atenção primária à saúde conclama um prodigioso potencial no fortalecimento dos princípios que norteiam esse nível de atenção, reposicionando o usuário no centro do modelo de cuidado e ampliando as opções terapêuticas eficazes e de baixo custo.

Palavras-chave: Atenção primária à saúde; Fitoterapia; Plantas medicinais; Jardins.

Resumen

Problema: Actualmente, el paradigma de la producción de salud está prodigado por una miríada de intereses comerciales, galanteos en el modelo biomédico que sobreestima el conocimiento científico moderno. Si bien están desacreditados por la soberanía científica, cerca del 70% del uso popular de las plantas medicinales está científicamente confirmado y este conocimiento no institucional es común en las prácticas cotidianas. Según datos de la Organización Mundial de la Salud (OMS), el 80% de la población de los países en vías de desarrollo utiliza prácticas tradicionales en la atención primaria de salud y, de ese total, el 85% hace uso de plantas medicinales. En Brasil, aproximadamente el 82% de los brasileños utiliza productos a base de plantas medicinales para cuidar su salud. Ante este desajuste, la atención primaria de salud se destaca como un espacio estratégico para abonar el terreno de las prácticas fitoterapéuticas. **Metodología:** Se trata de un estudio descriptivo, cualitativo, tipo relato de experiencia, sobre el desarrollo de un jardín medicinal ubicado en una Unidad de Salud Familiar en la ciudad de Recife, Pernambuco. Se utilizó un registro sistemático de actividades para su desarrollo mediante la confección de un diario de campo con registro fotográfico, complementado con un relevamiento bibliográfico y una investigación documental. **Resultados:** El proyecto pasó por las etapas Informativa, Estructural y Siembra, estableciendo diversos conocimientos basados en el espíritu de multiprofesionalidad y participación comunitaria. Al final, los esfuerzos culminaron con el establecimiento de un jardín medicinal, proporcionando un espacio para el intercambio de conocimientos y experiencias. **Conclusión:** Se concluye que la estructuración de un jardín medicinal en el ámbito de la atención primaria de salud exige un potencial prodigioso en el fortalecimiento de los principios que orientan este nivel de atención, reposicionando al usuario en el centro del modelo de atención y ampliando la eficacia terapéutica. opciones y bajo costo.

Palabras clave: Atención primaria de salud; Fitoterapia; Plantas medicinales; Jardines.

INTRODUCTION

Gema Conte Piccinini, in her brief historical background on the use of medicinal plants, wrote:

Pio Font Quer (1988) considered the last 500,000 years, in the creative figure of a hypothetical year of 365 days, each day corresponding to 1,370 years; every hour, to 57 years; and every minute, almost a year. This year, January 1st would correspond to the appearance of man on Earth, and today we would be at midnight on December 31st. Only on December 26th, at night, equivalent to 5,000 BC, did man arrive at the great discoveries of the Stone Age: the wheel, the domestication of plants and animals, farming. Going through this hypothetical year, at approximately at 3 p.m. on December 30th, Dioscorides, a Greek physician who lived in the first century of our era, wrote his famous treatise "Materia Medica". And, after 10 p.m. on December 31st, equivalent to the year 1897, Félix Hoffman was developing the

first synthetic drug, the aspirin. In this sense, a strong concern arises: what did the mankind do during 98% of their existence? They obviously survived and discovered the correct way to live and nourish oneself and found solutions to their ills mainly through medicinal plants. This contextualization punctuates the recent beginning of the scientific era in the long history of humanity. Fantastic, powerful, yet arrogant, fragmented, and mutilating.¹

Currently, the paradigm of health production is lavished by a myriad of mercantile interests that woo the biomedical model, which overvalues modern scientific knowledge, “determining conceptions about the body as a machine, individual, biological, universal, and timeless”.² However, even though the popular use of medicinal plants is discredited by scientific sovereignty, about 70% of this use is scientifically confirmed,³ and this non-institutional knowledge is frequent in everyday practices.²

According to data from the World Health Organization (WHO), 80% of the population of developing countries uses traditional practices in primary health care (PHC) and, of this total, 85% use medicinal plants.⁴ In Brazil, despite the country showing a low prevalence of 4.5% in alternative medicines, according to an epidemiological survey for the year 2020 by the partnership between the Ministry of Health (MoH) and the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística – IBGE*), phytotherapy leads this podium.⁵ It is estimated that 82% of Brazilians use medicinal plant-based products to take care of their health.⁶

In 1978, at the First International Conference on Primary Health Care, the WHO recommended that member countries identify and value traditional health practices in their territories.^{7,8} This was the official recognition of phytotherapy as a therapeutic tool and the “first step to the appreciation of its popular and traditional aspects”.⁷ In Brazil, the MoH, with the objective of expanding the population’s access to services related to phytotherapy, approved in 2006 the National Policy on Integrative and Complementary Practices in Health⁹ and the National Policy of Medicinal Plants and Phytotherapics (*Política Nacional de Plantas Medicinais e Fitoterápicos – PNPMF*),⁴ in addition to the National Program of Medicinal Plants and Phytotherapics, in 2008.¹⁰ In 2009, the government published the National List of Medicinal Plants of Interest to SUS (*Relação Nacional de Plantas Medicinais de Interesse ao SUS – RENISUS*), consisting of 71 plant species with therapeutic potential.¹¹ In 2010, *Farmácia Viva* was enacted within the scope of the Unified Health System (SUS)⁷ and, in 2012, the National List of Essential Medicines (*Relação Nacional de Medicamentos Essenciais – RENAME*) now includes 12 herbal medicines, as another strategy to expand the population’s safe and quality access to this type of medicine.¹²⁻¹⁴

Despite advances,^{15,16} phytotherapeutic practices are still plastered throughout the national territory. Even though it was established in 2010, *Farmácia Viva*, one of the largest medicinal plants initiatives in Brazil, occupies a marginal position in the health system.^{17,18} Although the country has a biodiversity that makes up 11 to 22% of the world total, 100% of the raw material destined for the herbal medicine industry comes from imports,⁶ which exposes the null effectiveness of the use of national resources. This can be explained by the existence of few studies on the potential for therapeutic use of Brazilian flora, since, out of 55 thousand plant species, only 0.4% were researched phytochemically or pharmacologically.⁶ A review published in 2013 corroborates this persistent academic undervaluation.¹⁹ Another bibliographic survey, published in 2014 by the same authors, revealed that in the last 25 years there has been a small increase in scientific production on phytotherapy actions/programs developed in PHC.²⁰

Since the architecture of PHC is anchored in principles such as integrality, community approach, and team-based work, it stands out as a strategic space to fertilize the terrain of phytotherapeutic practices. In view of the mismatch between the scarce literature and the potential of phytotherapy for health promotion and care, this experience report on the cultivation of a medicinal garden in a Family Health Unit (*Unidade de Saúde da Família – USF*) contributes to the production of knowledge in this area, celebrating the appreciation and strengthening of these practices and knowledge of ancestral transmission in one of the levels of care included in the complex Brazilian public health system.

METHODS

This is a descriptive, qualitative, experience report type study, written in accordance with the Standards for Quality Improvement Reporting Excellence (SQUIRE) 2.0 guidelines. For its development, a systematic record of activities was used through the creation of a field diary with photographic records, available in Appendix 1 (Figures 1 to 34 accessible as supplementary material at the electronic address <<https://doi.org/10.6084/m9.figshare.14025428>>) and complemented by bibliographic survey and documentary research. The search strategy of the survey used the descriptors “primary health care”; “phytotherapy”; “medicinal plants/herbs”; and “medicinal gardens/gardens” in PubMed, Latin American and Caribbean Literature on Health Sciences (Lilacs), and Google Scholar databases, composing the present study through master’s/doctoral dissertations, undergraduation papers, books, and articles. In the documentary research, the following documents were accessed: National Policy on Integrative and Complementary Practices (*Política Nacional de Práticas Integrativas e Complementares – PNPICS*), of 2006;⁹ PNPMF, of 2006;⁴ National Program of Medicinal Plants and Phytotherapics, of 2008;¹⁰ RENISUS, of 2009;¹¹ Resolution of the Collegiate Board of Directors (*Resolução da Diretoria Colegiada – RDC*), of October 2010;²¹ Handbook for Primary Care of Medicinal Plants (*Caderno de Atenção Básica de Plantas Medicinais*) 2012;⁶ State Handbook of Medicinal Plants of Pernambuco (*Cartilha Estadual de Plantas Medicinais de Pernambuco*) 2014;²² Brazilian Pharmacopoeia 1st Edition: Phytotherapeutic Memento approved by ANVISA/2016;²³ Municipal List of Essential Medicines of the Municipality of Recife (*Relação Municipal de Medicamentos Essenciais do Município de Recife – REMUME*)/2019;²⁴ State List of Essential Medicines of the State of Pernambuco (*Relação Estadual de Medicamentos Essenciais do Estado de Pernambuco – REESME*)/2019;²⁵ State Handbook of Medicinal Plants of São Paulo/2019²⁶, and RENAME of 2020.²⁷

The present report describes the compositional process of a medicinal garden, during the period from August 2019 to February 2021, located at USF Cosme & Damião, in the city of Recife, Pernambuco, characterized by being a school unit for the preceptorship of students and residents. The USF is consisted of a single family health team, composed of a family doctor, a nurse, an oral service assistant, five community health agents, an administrative agent, a receptionist, a security guard, and a general services employee. The ascribed territory covers about 3 thousand registered people and around 5 thousand people by calculation of a statistical estimate in which there is a land contiguously adjacent to the physical structure of the USF, with an extension of 17.95 x 4.5 m², stage of our multiprofessional artistic performance (Figure 1).



FCM: Family and Community Medicine.

Graphic 1. Actors involved in the project.

This project went through some stages, which can be divided into three major phases: informational, structural, and planting (Chart 1). These steps were defined according to the guidance of the reference material in Primary Care of the Telehealth Center of Santa Catarina (Table 1).¹³

The actors involved in the project were: undergraduate medical, architecture, and agronomy students; residents in Family and Community and Multiprofessional Medicine; USF family health team; a multi-professional support network (agronomists from the Department of the Environment; Pernambuco Supply and Logistics Center — Ceasa; Treatment Station, Selective Collection and Composting; Sanitary District IV; plastic artist; carpenters) and from the communities themselves (Graphic 1).

Regarding the ethical aspects, as it is an experience report, not involving direct research with humans or animals, submission to the ethics committee was not necessary. In addition, the identity of those involved is preserved.

Chart 1. Schedule of activities.

Schedule	Aug/2019	Oct/2019	Dec/2019	Jan/2020	Feb/2020	COVID-19	Aug-Sep/2020	Oct-Nov/2020	Feb/2021
Information									
Visit to institutions	X								
Visit of the Secretariat of the Environment to the UBS		X							
Measurement of proportions		X							
Survey of plants with community members		X						X	
Bibliographic survey, documentary research, and article writing							X	X	X
Structure									
Cleaning the lands		X					X		X
Pallet factory: facade and flowerbeds; parasols			X	X					X
Plastic art: graffiti					X		X		
Outside of the flowerbeds								X	
Planting									
Fertilized land							X		
Planting of the first species								X	

RESULTS

In August 2019, in order to equip ourselves with minimal prior knowledge that would light the way to the formulation of the medicinal garden, we visited centers for integrative practices and the Recife Botanical Garden, where we got to know the institution's medicinal garden, its more than 40 botanical species, and we were instructed on the principles of building a medicinal garden and the agricultural particularities of some plants (Figures 2 and 3).

In October 2019, through the board of Primary Health Care in Recife, a visit to USF Cosme & Damiano was carried out by the agronomist of the Secretariat of the Environment, who guided us on which species

Table 1. Steps to organize actions with phytotherapy.

Steps	What to do?
1. How to institutionalize?	- Public policies to guide the organization of the flow of access to services related to phytotherapy.
2. How to recognize, register, identify, and select local medicinal plants?	- Survey of information on popular use of medicinal plants in the community; - Register the self-referred plates in the Simplified Data Collection (CDS) form of the individual registration of the e-SUS; Own system or the Citizen's Electronic Health Record (<i>Prontuário Eletrônico do Cidadão – PEC</i>); - Selection of potential medicinal plants for AB clinical practice; - Identification of the main health problems treated by medicinal plants.
3. Which phytotherapy services and actions can I include in Primary Care?	- Gardens, vegetable gardens, live pharmacy, dispensing, prescription, educational actions; - What to do? - For whom? - When? - Where to do?
4. Which medicinal plants and phytotherapics can I indicate or contradict their use in different health problems treated at AB?	- Municipal list of medicines and herbal medicines; - Therapeutic mementos; Consult and search: - National Phytotherapeutic Form and supplements; - BVS evidence portal – traditional, complementary, and integrative medicines.

Source: Telehealth Center of Santa Catarina

would be possible to be planted in that place and on the anthropometric dimensions of the beds. Then, an architecture scholar checked the proportions, creating the ground floor plan (Figure 4). The first cleaning of the area was also carried out in conjunction with the Urban Cleaning and Maintenance Company (*Empresa de Manutenção e Limpeza Urbana – Emlurb*) (Figure 5) and, throughout the course of the project, with the help of community members (Figure 6).

Subsequently, we visited a factory for wooden structures and requested the manufacture of the facade of the garden and the eight beds, proportionately in line with the agronomist's guidelines. A community member helped transport these structural parts to the UBS, which were properly installed by a service team sent by the Health District (Figures 7 to 9) and, later, the covers were also inserted (Figures 10 and 11).

Immediately afterward, a plastic artist who works with graffiti, known for designing resplendent murals in the busy avenues of the city of Recife, was contacted, who promptly embraced the project, making himself available for free to perform the art in the garden space. With the advent of the COVID-19 pandemic, the artistic process was interrupted and only came to an end after the critical period of the serious public health crisis that devastated the world, when art symbolically accompanied, in this second moment, the feelings of renewal and hope corresponding to the "convalescence period" of the coronavirus (Figures 12 to 17).

At the same time, educational activities were carried out in the auriculotherapy group and in the "*De Bem com A Vida*" aged group, both activities practiced at the USF Cosme & Damião. At that moment, they

were oriented on herbs together with a pharmaceutical resident and a survey was carried out inquiring about which medicinal plants the participants used, which they would like to be cultivated, and about the possibility of donating seedlings (Figures 18 and 19). In addition, it was elucidated which herbal medicines were available at the USF, and there was only one (guaco syrup), below the other five species identified in the Municipal List of Essential Medicines of the Municipality of Recife (*Relação Municipal de Medicamentos Essenciais do Município de Recife*) 2019²⁴ and the other 11 species that appear in the State List of Essential Medicines of Pernambuco (*Relação Estadual de Medicamentos Essenciais de Pernambuco*) 2019²⁵, and in the National List of Essential Medicines (*Relação Nacional de Medicamentos Essenciais*) 2020.²⁷

At the dawn of January 2020, with the basic structure flattened, we provided the fertilized land, made available by the Pernambuco Supply and Logistics Center (*Centro de Abastecimento e Logística de Pernambuco – CEASA*) and by the Treatment, Selective Collection and Composting Station of the municipality of Recife (Figure 20).

On October 29th, 2020, after easing the critical period of the COVID-19 pandemic, the first planting was carried out, with users participating in the aged group, of the most used and chosen medicinal plants according to the previous survey, after donation of seedlings by the communities themselves (Figures 21 to 24). Among them, were: national boldo (*Plectranthus barbatus*), large mint (*Plectranthus amboinicus*), small mint (*Mentha × piperita L.*), mastruz (*Dysphania ambrosioides*), and corama (*Kalanchoe Brasiliensis*). On that occasion, informative booklets were distributed (Figure 25) and then the irrigation system with PET bottles was established (Figure 26) to moisten the beds during the weekend, a period in which the health unit is usually not in operation.

Subsequently, the facade was also decorated through community participation (Figures 27 to 30) and plaques were placed indicating each species of medicinal plant (Figure 31). To date, 11 species have been cultivated in the medicinal garden, in addition to the five mentioned above: aloe (*Aloe Vera*), basil (*Ocimum basilicum*), coriander (*Coriandrum sativum*), okra (*Abelmoschus esculentus*), lemongrass (*Cymbopogon citratus*), and rosemary (*Rosmarinus officinalis*) (Figures 32 to 34). At the end of this process, a protocol was prepared for the health unit on the use of medicinal plants grown in the garden, which is available in Appendix 2 (accessible as supplementary material <<https://doi.org/10.6084/m9.figshare.14025428>>).

DISCUSSION

Today, “the insufficiency of the Cartesian-biomedical model in responding to the complexity of the health-disease phenomenon” is recognized.²⁸ As a result of this paradigm crisis, integrative and complementary practices (ICP) emerge as a new look and expand the interpretations of the onset of the disease, which “involves a dynamic relationship of physical, emotional, mental, and sometimes spiritual factors”.²⁹ However, the difficulties demonstrate that, in addition to the low prevalence in the use of alternative medicines compared to other countries,⁵ the low supply of medicinal plants in health services,^{5,30-32} the lack of knowledge about the offer of integrative practices in the public service,³³ the little academic contact as institutionalized knowledge,³⁴⁻³⁶ the scarce scientific production^{19,20,32,37-39}, and of low professional qualification,⁴⁰⁻⁴³ there are core challenges in reconciling ICPs and the biomedical vision,⁴⁴ because they “represent different paradigms of medical rationalities, which unfold in different forms of procedures and treatments.”⁴⁵

These obstacles translated into three main challenges throughout the project’s development:

1. The *academic*, since, during the preparation of the protocol, it does not scientifically identify the therapeutic properties of two species (mastruz and corama), widely used by the population;
2. *Financing*, as despite the monetary assistance provided by the competent body of the municipality's PHC at times, most of the project was funded by the participants themselves;
3. The *multiprofessional demand*, as it was evident the difficulty in constellating the various knowledge required along the trajectory to converge in the structuring of a medicinal garden, beyond the competences of a family health team.

In light of the foregoing, the following question arises:

How can I keep the best of modern Western culture alive in me and, at the same time, recognize the value of the diversity of the world that it has authoritatively designated as uncivilized, ignorant, residual, inferior, or unproductive?¹⁷

It should be noted that “it is not a matter of invalidating the classical paradigm, but of bringing it back to its limits”,⁴⁶ in this sense, “the criticism that must be made is not the paradigm itself, but its unjustified expansionism, the claim that it can rise to the domain of the “universal”, trying to explain everything”.⁴⁶ In other words, “as long as it is brought back to its limits, a paradigm always retains its validity.”⁴⁶ In this context, the development of a garden medicine in PHC, as it is situated in an equidistant position between the community and the academy, it invigorates integrative practices within the scope of the SUS and shines as a legitimate answer to the previous questioning, as it intertwines the heterogeneity of dimensions involved in the health-disease process and allows for a certain overcoming in the fragmentation of care, bringing the paradigm back to its limits and integrating the best of each rationality.

Thus,

the proposal with the introduction of ICPs in PHC is not to find the best type of care, but to diversify the practices offered to cover different conceptions of health and care, thus contributing to qualify the health work process and assistance in primary care.⁴⁴

Among the potential benefits of the garden in promoting health, several points can be listed:

1. Physical effort, as it makes it possible to appease the sedentary lifestyle;⁴⁷
2. Mental activity, by caring for plants — which can be seen as a soft mental health technology;⁴⁸
3. The possible rescue of memories of the roots in the countryside or childhood in the farming, “asleep with coming to the city and with new jobs”;⁴⁵
4. The space for well-being, which provides greater awareness and the learning of concrete tools and that rescues self-care, extending to family members and the neighborhood;⁴⁵
5. “The incentive for the use of natural medicines, with the reduction of the use of industrialized medicines and enjoying teas for common symptoms such as headaches, stomachaches, flu and colds”;⁴⁷
6. No restriction on the scope of health, as environmental education is understood as a process through which the individual and the community build social values, knowledge, skills, and attitudes aimed at conserving the environment;⁴⁹

7. The reduction in the use of pesticides, by praising agroecological cultivation;⁴⁷
8. Its usefulness as a possible source of income or regional economic stimulus if, for example, it composes a local productive arrangement (LPA) financed by the MoH;⁵⁰
9. The fact that it represents an “important device to strengthen the bonds between users, professionals, students, and other social actors related to the teams’ work processes”,⁵¹ strengthening one of the main foundations of primary care: welcoming — a word which is noble, mysterious and full of spirit.

Thus, the implementation of a medicinal garden in the basic health unit demonstrates the potential to represent, correlating it with the titles of some articles in the literature, the “instrumental search”,⁵² “the audible cry”,² the “green space to green prescriptions”³⁹ or, perhaps, “the missing link”³⁸ with nature and its latent therapeutic virtues. And, despite the challenges, teamwork, even with community participation in all three phases of the process, emerged as a driving force to engender the project, providing opportunities for intimate reflections and the mutual growth of the participating subjects. In that regard,

“teamwork is recommended as if it were a panacea capable of solving, by itself, the problems of health practices arising from the complexity of the health-disease process in singular individuals and in the population scope.”⁵³

It is concluded that the structuring of a medicinal garden within the scope of PHC calls for a prodigious potential in strengthening the principles that guide this level of care, repositioning the user at the center of the care model and expanding effective and low-cost therapeutic options.

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CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS’ CONTRIBUTIONS

GBMM: Project administration, Formal analysis, Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Methodology, Resources, Supervision, Validation, Visualization. BHSP: Project administration, Formal analysis, Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Methodology, Resources, Supervision, Validation, Visualization.

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