RCMOS – Multidisciplinary Scientific Journal of Knowledge.
ISSN: 2675-9128. São Paulo-SP.
Year V, v.1, n.1, Jan/July 2025. | submission: 27/01/2025 | accepted: 29/01/2025 | publication: 31/01/2025

IMPLEMENTATION OF A DEMONSTRATIVE GARDEN UNIT MEDICINAL AT UEG ITAPURANGA

IMPLEMENTATION OF A DEMONSTRATIVE UNIT OF MEDICINAL GARDEN AT UEG ITAPURANGA

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SUMMARY:

This study describes the installation of a demonstration unit for the cultivation of medicinal plants at the State University of Goiás (UEG), Itapuranga University Unit. The initiative was implemented from July 2024, covering 24 species selected based on their therapeutic potential, adaptation to the regional climate, and acceptance by local residents. The seedlings were provided by a partner institution, which also promoted a workshop on responsible planting and management practices. To structure the garden, an area of approximately 85 m² was used, where the area designated for the project was organized in order to optimize light and management, using techniques that included analysis and adequate preparation of the soil with natural inputs. Informational signs with QR Codes were installed,

providing details about each species. In addition to meeting academic demands, the space also received visits from students from public schools, promoting environmental awareness and the recovery of traditional knowledge related to the use of medicinal plants. The results obtained demonstrate the viability of the project and its positive impact on the valorization of biodiversity, economic sustainability and the strengthening of the relationship between university and community.
Keywords: Medicinal garden. Phytotherapy. Teaching and extension. Biodiversity.

ABSTRACT:

This study describes the establishment of a demonstrative unit for medicinal plant cultivation at the State University of Goiás (UEG), Itapuranga Campus. The initiative was implemented in July 2024 and involved 24 species selected based on their therapeutic potential, adaptation to the regional climate, and acceptance by the local population. Seedlings were provided by a partner institution, which also organized a workshop on planting practices and responsible management. An area of approximately 85 m^2 was designated for the project and organized to optimize sunlight exposure and facilitate maintenance, using techniques that included soil analysis and preparation with natural inputs. Informative plaques with QR codes were installed, providing detailed information about each species. In addition to meeting academic demands, the space also hosted visits from public school students, promoting environmental awareness and the preservation of traditional knowledge related to the use of medicinal plants. The results demonstrated the project's feasibility and its positive impact on evaluating biodiversity, economic sustainability, and strengthening the relationship between the university and the community. **Keywords:**Medicinal garden. Phytotherapy. Teaching and extension. Biodiversity.

1. INTRODUCTION

Phytotherapy, a practice that uses medicinal plants for therapeutic purposes, has been consolidating itself as a complementary and sustainable approach to health promotion. Bruning, Mosegui and Vianna (2012) highlight that phytotherapy is widely used in the Unified Health System (SUS) due to its effectiveness in clinical conditions such as inflammation, digestive and respiratory disorders, in addition to its potential to expand access to health in more vulnerable communities. In this sense, Brazil positions itself as one of the leaders in the appreciation of phytotherapeutic practices, especially through the National Policy on Medicinal Plants and Phytotherapeutics (PNPMF) (BRASIL, 2006).

The PNPMF, established in 2006, promotes the sustainable use of Brazilian biodiversity and values traditional knowledge associated with popular practices (BRASIL, 2006). Brasil (2012) argue that the policy plays a strategic role in expanding access to natural treatments, strengthening the integration between traditional knowledge and evidence

scientific. According to the authors, the rational and guided use of medicinal plants can mitigate risks associated with drug interactions, a point that is also emphasized by Guarin Neto and Morais (2003), when analyzing the bioactive compounds of plants from the Brazilian Cerrado.

From an ethnobotany perspective, Almeida and Albuquerque (2002) suggest that the recovery of popular knowledge is essential for the preservation of biodiversity and the development of sustainable agricultural practices. In Brazil, this science has contributed to the appreciation of medicinal plants as a cultural, economic and environmental tool. Projects such as Farmácia Viva do Xixá exemplify this approach by combining the production of medicinal plants with the promotion of public health and environmental education (Reis*et al.*, 2024).

The practice of ethnobotany is particularly important in regions such as Itapuranga, where the rich interaction between the local population and the regional flora results in a wide variety of medicinal and cultural uses for plants. Data from the Research Bulletin show that 92.8% of the local population uses medicinal plants, indicating a solid base of traditional knowledge (Ribon*et al.*, 2024).

The socioeconomic impact of medicinal plant cultivation is also widely recognized. According to Lima, Lima and Donazollo (2007), the production of these plants can strengthen the local economy, generate employment opportunities for family farmers and encourage sustainable agricultural practices. In addition, the implementation of medicinal gardens in educational institutions also brings significant contributions to university teaching and extension. According to Santos*et al.*, (2023), these spaces promote the practical application of theoretical content, especially in disciplines related to environmental sciences and health. They point out that, by connecting formal education to the sustainable use of natural resources, gardens become environments that stimulate active learning and ecological awareness, strengthening the dialogue between academia and the local community.

On the global stage, the market for medicinal plants and phytotherapeutics has shown significant growth, highlighting the relevance of initiatives such as the PNPMF to position Brazil as a leader in this segment. Terra Junior, Maldonado and Arnóbio (2015) argue that the demand for natural products has driven research on native species and fostered the development of new phytotherapeutics with potential for export. In Itapuranga, the technical bulletins of the Farmácia Viva do Xixá project show that 38.1%

of small producers expressed interest in cultivating medicinal plants, highlighting the economic and cultural relevance of this practice for the region (*Reis et al.*, 2024).

In this sense, the installation of a medicinal garden is a multifunctional strategy that transcends the supply of medicinal plants. These spaces promote environmental education, sustainability and community integration, functioning as centers for the recovery of traditional knowledge and the dissemination of sustainable cultivation practices (Silva, 2012).

Thus, this study aims to describe the implementation of a demonstration unit of medicinal garden at UEG Itapuranga, promoting the integration between teaching, research and extension. The proposal aims to rescue and value traditional knowledge about medicinal plants, while fostering economic and environmental sustainability in the region, in line with national guidelines for health promotion and biodiversity conservation.

2. MATERIALS AND METHODS

The work was carried out on the premises of the State University of Goiás, Itapuranga University Unit, starting in July 2024, and included the installation of a medicinal garden within the institution. 24 species of medicinal plants were selected, taking into account their relevance to the folk medicine of the urban and rural populations of Itapuranga, their therapeutic properties, adaptability to the local climate and acceptance by the community.

The seedlings were provided by partner company Live Aloe, as part of a workshop aimed at Geography students at UEG-Itapuranga. In addition, a partnership was established with local public schools for guided tours of the garden, expanding the educational reach and promoting environmental awareness among students in the region.

To prepare the soil, a mixture of red soil, organic fertilizer and charcoal in a 1:1 ratio was used, properly aerated to optimize drainage and nutrient availability. The beds were structured with dimensions of 14 m x 1 m and 2 m x 1 m, organized to accommodate the plants with spacing of 0.30 m x 0.30 m between seedlings. The arrangement of the species was planned according to the size and light requirements of each plant. After planting, the beds were irrigated by sprinklers, and each

The species was identified by signs containing the popular name, the scientific name and QR Codes with information about its medicinal properties, accessible by mobile devices.

The cultural treatments implemented included weekly control of invasive plants, carried out manually with the aid of simple tools such as a hoe and shovel. Irrigation was carried out using micro-sprinklers, with two daily shifts during dry periods, optimizing water use. In addition, regular monitoring of plant growth and soil conditions was carried out, ensuring the success of the project.

A technical analysis was carried out in November 2024, with samples collected from the surface layer of the soil (0 to 20 cm), using a Saci Tai model auger, ensuring the accuracy of the procedure. The results of this analysis made it possible to identify the chemical composition and fertility of the soil, enabling the necessary corrections to ensure the healthy development of the species.

Finally, based on the species selected for the composition of the garden, an illustrative table was created presenting the cultivated medicinal plants and their main characteristics.

3. RESULTS AND DISCUSSION

With the aim of promoting cultural appreciation and the dissemination of information about medicinal plants, an area of approximately 85 m² was made available for the implementation of the medicinal garden, located within UEG-Itapuranga (Figure 1).

Figure 1:UEG-Itapuranga area made available for the implementation of the Medicinal Garden

Source: Google Earth (2024)

According to Azevedo and Moura (2010), the cultivation area must have at least five hours of sunlight. Since this is an area with a lot of sunlight, it was decided to build a greenhouse with wood to stretch shade cloth over the beds (Figure 2), allowing the amount of sunlight reaching the plants to be regulated, avoiding excess radiation that can be harmful. Furthermore, the greenhouse closed with shade cloth protects the plants from insects and heavy rains, in addition to reducing thermal and water stress. It creates a microclimate favorable to cultivation and prevents the entry of invasive plants, ensuring a more controlled and efficient environment for the healthy development of medicinal species (Reis, 2005).

Figure 2: Wooden structure with shade over the flowerbeds and sprinkler irrigation system.

Source: Author (2024)

The medicinal garden used a simple and efficient irrigation system, which did not use electrical energy. This option for a mechanical system served to reduce the cost of implementation and maintenance. The materials used were low cost and a distance of 2 m was adopted between each sprinkler. Thus, the method used was sprinkler irrigation (Figure 2), which simulated artificial rain, providing a uniform distribution of water on the plants, always carried out at times of no wind or low intensity, lower temperature and high relative humidity, generally in the early hours of the morning, late afternoon or at night (Marouelli*et al*,2011).

The construction of the beds in the medicinal garden of UEG Itapuranga followed recommended practices to optimize the development of medicinal plants. The beds were oriented from east to west to maximize solar exposure, as suggested

by Araújo Neto (2020). The dimensions adopted, with a width of 1 meter and a length of 14 meters, facilitated management and circulation between the beds, in line with the recommendations of Heredia Zárate and Vieira (2016), who recommend widths between 1.0 and 1.2 meters to facilitate access and management of the plants. Soil preparation included the incorporation of organic matter to improve structure and fertility, a practice highlighted by Cardoso and Magro (2021) as essential for water and nutrient retention. In addition, mulching techniques were used to conserve soil moisture and control weeds, as recommended by Araújo Neto (2020). These integrated approaches ensured an environment suitable for the sustainable cultivation of the selected medicinal species.

Some seedlings were provided by the partner company Live Aloe, as part of a workshop held for Geography students at UEG-Itapuranga (Figure 3). During the event, topics such as cultivation techniques, sustainable management and therapeutic applications of medicinal plants were discussed.

Figure 3: Preparation of seedlings for the medicinal garden during the workshop in partnership with the company Live Aloe.

Source: Author (2024)

In preparing the seedlings, vegetative propagation and seed propagation were used, according to the needs of each species. Species such as aloe (*Aloe vera*) and mint (*Mentha spicata*) were propagated by means of cuttings or division of clumps, methods that ensure greater genetic uniformity and accelerate the development of the plants. Plants such as rosemary (*Rosmarinus officinalis*) and basil (*Ocimum basilicum*) were propagated from seeds, which underwent a selection and germination process in suitable substrates, composed of vermiculite, sand and organic matter, ensuring good aeration and moisture retention conditions (Paulus*et al.*, 2010). These techniques are recommended for cultivation

sustainable production of medicinal plants, promoting rapid establishment of seedlings and high survival rates in the field (Azevedo and Moura, 2010).

The analysis of soil samples collected in the garden revealed important characteristics for the proper management of medicinal species. The pH of the samples, ranging from 5.2 to 6.4, indicated a slightly acidic soil, suitable for most of the selected species, but with potential for specific adjustments with the application of limestone. Slightly acidic soils favor the growth of plants such as aloe vera and citronella (Carvalho, 2015).

Phosphorus levels in the samples were low (2.0 mg/dm³ in the Front and 0.8 mg/dm³ in the Bottom), which may limit root development and nutrient uptake. According to Sousa *et al.*(2004), the application of natural phosphate is a technically and economically viable alternative to improve the fertility of cerrado soils, especially in acidic soils with low phosphorus contents.

Organic matter levels, ranging from 1.0% to 1.6%, were considered low, negatively impacting water retention capacity and overall soil fertility. According to Costa *et al.*(2008), the practice of organic fertilization, in addition to providing nutrients for plants, improves the physical structure of the soil, increases water retention, reduces losses due to erosion and favors biological control.

The exchangeable cation contents showed significant variations between the samples. While the sample from the front of the medicinal garden demonstrated good availability of calcium and magnesium, the sample from the back showed reduced levels of these nutrients, indicating the need for corrections with limestone and specific fertilizers. These data corroborate the findings of Abreu Júnior,Muraoka and Oliveira (2001), who observed increases in exchangeable calcium and magnesium contents in soils treated with urban waste compost, highlighting the importance of organic fertilization to improve soil fertility.

The textural differences between the areas (sandy texture at the front and clayey texture at the back) indicate the need for different management. Sandy soils, such as those found at the front of the garden, have a lower capacity for retaining water and nutrients, and are more suitable for species such as rosemary (*Rosmarinus officinalis*), lemongrass (*Cymbopogon citratus*) and mint (*Mentha spicata*), which are more resistant to conditions of low water retention. On the other hand, clay soils, which are predominant in the posterior part, are richer in water and nutrient retention, making them ideal for growing species such as

ginger (*Zingiber officinale*), aloe (*Aloe vera*) and rue (*Ruta graveolens*), which require greater nutritional support for their full development.

According to Demattê and Demattê (2024), the combination of practices such as green manure and the use of organic matter improves cultivation efficiency in soils with contrasting characteristics.

To correct the deficiencies observed in the soil analysis, specific actions were implemented. In sandy soils, mulch and organic compounds were applied to improve water retention and nutrient availability. In clay soils, the incorporation of dolomitic limestone and organic fertilizer helped to balance the calcium and magnesium levels, preventing compaction and promoting adequate aeration. In addition, natural phosphate was used to compensate for the low availability of phosphorus in both areas, optimizing root development and nutrient absorption. These practices ensured efficient management adapted to the characteristics of each area, promoting the balanced growth of the cultivated species and reinforcing the sustainability of the garden.

For the selection of species, as observed by Ribon et al. (2024), some stand out for greater interest in use by the urban and rural population of Itapuranga. Based on this information and also on their therapeutic properties, the species chosen were: Rosemary*(Rosmarinus officinalis)*; Basil*(Ocimum freesimum)*; Arnica*(Arnica montana*); Rue*(Ruta graveolens)*; Aloe*(Aloe vera)*; Thin-leaf aloe*(Aloe arborescens)*; Boldo*(Plectranthus barbatus)*; Chamomile*(Matricaria chamomilla)*; Lemongrass*(Cymbopogon citratus)*; Carqueja*(Baccharis trimera)*; Horsetail *(Equisetum arvense)*; Citronella*(Cymbopogon nardus)*; Lemon balm*(Melissa officinalis)*; Fennel*(Foeniculum vulgare Mill.)*; Ginger*(Zingiber officinale*; Guinea*(Petiveria alliacea)*; Mint*(Mentha spicata)*; Lavender*(Lavandula angustifolia)*; Large basil*(Ocimum basilicum)*; Moringa*(Moringa oleifera)*; Pray for us*(Pereskia aculeata)*; Pennyroyal*(Mentha pulegium)*; Saião*(Bryophyllum pinnatum)*; Sage*(Salvia officinalis)*; Plantain*(Plantago major*, all widely used in traditional medicine.

Medicinal plants grown in the medicinal garden of UEG Itapuranga play a central role in the integration of traditional practices and scientific innovations. Based on Table 1, which details the selected species, a wide diversity of plants with therapeutic properties and popular and scientific applications can be observed. Species such as rosemary (*Rosmarinus officinalis*), widely recognized for its antimicrobial properties and

digestive, and aloe vera (*Aloe vera*), with healing and antimicrobial applications, exemplify the therapeutic and cultural potential of these plants (Matos, 2024; Baracuhy*et al.*, 2016).

The selection of species also took into account criteria such as adaptability to the local climate, relevance to folk medicine and acceptance by the community. Studies corroborate that plants such as arnica (*Arnica montana*), known for its anti-inflammatory and healing properties, and lemongrass (*Cymbopogon citratus*), used as a mild sedative, are widely accepted and have high demand in local communities (Garlet, 2019; Matos, 2024).

In addition, identification plates with QR Codes installed in the beds make the information accessible, contributing to education and dissemination of knowledge about the sustainable use of medicinal plants. According to the identification plates designed for the garden and accessible via QR code, the following illustrative table (Table 1) shows the medicinal plants grown in the medicinal garden and their main characteristics.

Table 1: Medicinal plants grown in the medicinal garden and their main characteristics.

Popular name	Scientific name	Form of use lization	Medicinal use	Reference
Rosemary	*Rosmarinus officinalis* *nalis*	Tea, tincture or essential oil	Healing, antimicrobial and scalp stimulant in local applications; diuretic, cholagogue and choleretic; carminative, stimulates the elimination of bacteria. digestive system ses, relieving the feeling of packing.	Matos (2024)
Basil	*Ocimum gratissi-* *mum*	Infusion, xa- rope, cata- plasma	External bacterial infections; respiratory problems, flu, colds, cough and fever; intestinal gas; nais.	Tavares, Bar- bosa, Campos and Lucena (2015)

Arnica	*Arnica montana*	Infusion and decooking	It has astringent, emollient, and vulnerabilhealing (wound and sore healing), healing, antiinflammatory and gastroprotective tora; used in the treatment of gastrointestinal disorders, in cases of gastritis, gastric ulcers and diarrhea. Used externally in traumas, hematomas and necrosis. varicose veins.	Garlet (2019)
Rue	*Ruta graveolens*	Tea, infusion and maceration	Increases the resistance of blood vessels, preventing ruptures and is indicated for treatment of varicose veins and as an emmenagogue; compli- menstrual cycles	Souza, Oliveira Grandson, Pinto, Silva, Moraes and Gomes (2007)
Aloe vera	*Aloe vera*	Alcoholation, fresh gel, compresses and resin	Healing and antimicrobial; wounds and burns of the skin and mucous membranes, such as cervicovaginitis, gastric ulcers and hemorrhages. gnawing; laxative.	Baracuhy, Fur- Thank you, Francisco, Lima and Pereira (2016)
Aloe vera-thin-leaf	*Aloe arborescens*	Topical use (application of gel)	Antitumor activity, immunomodulatory, antiinflammatory, antiulcer, antimicrobial and antifungal.	Singab, El-Hefnawy, Esmat, Gad and Nazeam (2015)
Boldo	*Plectranthus barbatus*	Infusion	Digestion, nausea, vomiting, heartburn, gastric discomfort, bag.	Moura, Dantas and Oak (2021)
Chamomile	*Matricaria callomilla*	Infusion, bochechos, gargarejos and com- hurry	Antispasmodic, anxiolytic and mild sedative; antiinflammatory in conditions of the oral cavity.	Machado, Oliveira and Czermainski (2021)
Lemongrass	*Cymbopogon citreatises*	Tea or oil essential	Mild sedative and spasmolytic; relief for minor attacks of uterine and intestinal cramps; treatment of nervousness and restlessness. ality.	Matos (2024)

Carqueja	*Baccharis trimera*	Infusion and decooking	Alleviates digestive disorders liver and liver problems (gastritis, heartburn and indigestion); gallstones; constipation; flu and colds; antirheumatic, anthelmintic, antidiabetic, antidiarrheal and wound healing; digestion problems.	Garlet (2019)
Horsetail	*Equisetum arvense*	Infusion	Cholesterol, cures a hundred and a few diseases, diabetes, diuretic, weight loss, inbladder infections, throat infection, infections in the kidneys, wash wounds, clean the blood, kidney stones, high blood pressure, prostate and vesicle.	Battisti, Garlet, Essi, Horbach, Andrade and Badke (2013)
Citronella	*Cymbopogon nartwo*	Essential oil	Insect repellent action, activity against Aedes aegypti mosquito larvae and antimicrobial activity.	Silveira, Cunha, Scheuermann, Dry, Verruck, Krohn and Vieira (2012)
Lemon balm	*Melissa officinalis*	Infusion	Antispasmodic, anxiolytic tic and mild sedative.	Machado, Oliveira and Czermainski (2021)
Fennel	*Foeniculum vulvae Mill station.*	Tea, cooking and infusion	Soothing, digestive (combats cramps), carminative and antispasmodic; stimulates lactation.	Baracuhy, FurThank you, Francisco, Lima and Pereira (2016)

Ginger	*Zingiber officinale*	Fresh root, compress	Used in cases of asthma, bronchitis, hoarseness and menorrhagia (loss of blood from the uterus). Antimicrobial, stimulant, digestive (in cases of dyspepsia), carminative (in flatulent colic), antiemetic, anti-inflammatory, anti-rheumatic, antiviral, antitussive, antiallergic, cardiotonic, and also acts in cases of thrombosis and inflammation. throat tion.	Baracuhy, Fur- Thank you, Francisco, Lima and Pereira (2016)
Guinea	*Petiveria alliacea*	Essential oil	Anti-inflammatory, anthelmintic, antimicrobial, antineoplastic and stimulant mules.	Guedes, No-gueira, Fusco-Almeida, Souza and Oliveira (2009)
Mint	*Mentha spicata*	Infusion, fresh, dried or powdered	Colic, constipation, digestive, lactation (increases milk secretion), combating vomiting; mule of appetite; vermifuge: giardia, amoeba (worms), rheumatism, soothing.	Tavares, Bar-bosa, Campos and Lucena (2015)
Lavender	*Lavandula angus typhus*	Essential oil	Stress and depression; antispasmodic, analgesic, pesticide, antimicrobial and antifungal.	Silveira, Cunha, Scheuermann, Dry, Verruck, Krohn and Vieira (2012)
Large basil	*Ocimum basilicum*	Fresh, culinary laugh or dry	Action against bacteria, fun-gos and worms. Used for itchy skin, insect bites and diseases of the skin, in addition to lowering fe-bre.	Moura, Dantas and Oak (2021)

Moringa	*Moringa oleifera*	Fresh, dry or powder	It has oil rich in olein, antimicrobial, the ointment has antibiotic properties. ethics.	Matos (2024)
Pray for us	*Pereskia aculeata*	Fresh, cooked or powder	Treats anemia, inflammation, burns and syphilis, expectorant; analgesic and antitumor.	Silva (2021)
Pennyroyal	*Mentha pulegium*	Tea	Balsamic, carminative and emmenagogue, treats cough and hoarseness.	Matos (2024)
Skirt	*Bryophyllum pinnatum*	Fresh leaves or in tea	Healing, anti-inflammatory, antimicrobial, antispasmodic and anti-amenorrheal (promotes menstruation). tion). It is used in the treatment of adnexitis (inflammation of the uterine appendages), gastritis, cough, bronchitis, inflammation of the uterus and ovary. It also serves to destroy tumors and combat have a headache.	Baracuhy, Fur- Thank you, Francisco, Lima and Pereira (2016)
Sage	*Salvia officinalis*	Infusion, combustion, cheek- chos and gargarules	Antidyspeptic, anti-inflammatory, antiseptic of the oral cavity; against bites of insects, skin infections, mouth ulcers and bad breath.	Machado, Oliveira and Czermainski (2021)

Tancha-gem	*Plantago major*	Infu-are, decoction, maceration and gargle	Antibacterial, anti-inflammatory, antidiarrheal, antiviral, healing, expectorant, laxative, diuretic therapeutic and purifying; treats skin conditions (acne, blackheads, pimples, allergies and wounds), insect bites, tonsillitis, stomatitis, pharyngitis, gingivitis, gastric ulcers, internal inflammation, menstrual cramps, hemorrhoids, candidiasis and infections; can be used as a detoxifier for the airways of smokers.	Garlet (2019)

Source: Author (2024)

The medicinal garden was also conceived as a teaching, research and extension tool, with an emphasis on the valorization of medicinal culture and the recovery of traditional knowledge. UEG Itapuranga, in partnership with the Georgina Rodrigues State School in the municipality of Guaraíta, promoted guided tours of the medicinal garden (Figure 4), during which educational activities were carried out that allowed students to understand the importance of medicinal plants in the context of public health and environmental sustainability. According to Paulert*et al.*(2022), medicinal plant gardens function as teaching spaces that support practical activities in disciplines and strengthen research, in addition to promoting transformative interaction between the university and the community. Furthermore, Santos and Santos (2021) highlight that school medicinal gardens contribute to the recovery of popular and scientific knowledge, providing students with a practical experience that enriches the teaching-learning process.

Figure 4: Guided visit for students to the UEG Itapuranga Medicinal Garden.

Source: Author (2024)

The data presented reinforce the importance of the medicinal garden as a model for valuing biodiversity and traditional knowledge, while encouraging sustainable practices and promoting public health. This initiative strengthens the relationship between the university and the community, highlighting how the use of medicinal plants can be integrated into teaching, research and extension, in addition to contributing to the economic and cultural development of the region.

The current state of the medicinal garden at UEG Itapuranga reflects the progress made since its implementation, as evidenced by the organized structure of the beds, the identification of species with educational signs, and the incorporation of elements that facilitate sustainable management, such as sprinkler irrigation. The images captured (Figure 5) demonstrate the progress in implementing the project and highlight its functionality as an integrated space for teaching, research, and extension. These visual records reinforce the importance of the garden as a model for preserving traditional knowledge and scientific innovation, in addition to highlighting its impact on strengthening the relationship between the university and the local community.

Figure 5: General view of the medicinal garden at UEG Itapuranga, highlighting the organization of the beds, the species cultivated and the use of educational signs with QR Code for identification and dissemination of information about medicinal plants.

Source: Author (2025)

FINAL CONSIDERATIONS

The implementation of the medicinal garden demonstration unit at UEG Itapuranga demonstrated the technical and social viability of the project, contributing to the strengthening of sustainable practices and the dissemination of knowledge about medicinal plants. In addition to promoting the appreciation of regional biodiversity, the initiative also stood out as an important space for teaching, research and extension, integrating traditional and scientific knowledge in an innovative way.

The involvement of different sectors of the local and academic community has allowed the construction of a dynamic educational environment, which favors both the exchange of knowledge and awareness of the importance of environmental sustainability and the rational use of natural resources. The practices developed in the garden reinforce the potential of plants

medicinal not only in the therapeutic scope, but also as an element of cultural and socioeconomic strengthening.

Through soil analysis, careful crop planning and extension activities, it was possible to demonstrate that initiatives like this have a significant positive impact. The results obtained highlight the importance of projects that connect the community to the university, promoting a transformative and collaborative relationship.

Therefore, the medicinal garden installed at UEG Itapuranga can be considered a replicable model for other regions, especially those with similar characteristics in terms of biodiversity and traditional practices. This project reinforces the importance of integrating teaching, research and extension as a strategy for valuing natural resources, strengthening local knowledge and sustainable development.

REFERENCES

ABREU JR., CH; MURAOKA, T.; OLIVEIRA, FC Exchangeable cations, cation exchange capacity and base saturation in Brazilian soils fertilized with urban waste compost.**Agricultural Science**, Piracicaba, v. 58, n. 4, p. 813-824, Oct./Dec. 2001. Available at: https://www.scielo.br/j/sa/a/xq4bwMRQQkCS9nLHjPzGztN/ Accessed on: January 24, 2025.

ALMEIDA, CFCBR; ALBUQUERQUE, UP Use and conservation of medicinal plants and animals in the state of Pernambuco.**Interscience**, v. 27, n. 6, p. 276-285, 2002. Available at:https://www.redalyc.org/pdf/339/33906902.pdf . Accessed on: January 24, 2025.

ARAÚJO NETO, PR Preparation of beds for growing vegetables. Teresina: Embrapa Meio-Norte, 2020. Available at: https://www.infoteca.cnptia.embrapa.br/infoteca/bitstream/doc/1128574/1/PreparoCanteirosCultivoHortalicas.pdf . Accessed on: January 24, 2025.

AZEVEDO, Celma Domingos de & MOURA, Maria Aparecida de. Cultivation of medicinal plants: practical guide -- Niterói: Rio Rural Program, 2010. 19 p. ; 30 cm. – (Rio Rural Program. Technical Manual; 27).

BARACUHY, José Geraldo de Vasconcelos; FURTADO, Dermeval Araújo; FRANCISCO, Paulo Roberto Megna; LIMA, José Luciano Santos de; PEREIRA, Jógerson Pinto Gomes (Org.). Medicinal plants in common use in the Northeast of Brazil. 2nd ed. rev. Campina Grande: EDUFCG, 2016. Available at: https://www.researchgate.net/publication/303921323_Plantas_Medicinais_de_uso_comum_n___the_Northeast_of_Brazil. Accessed on: January 7, 2025

BATTISTI, Caroline; GARLET, Tanea Maria Bisognin; ESSI, Liliana; HORBACH, Roberta Klein; ANDRADE, Andressa de; BADKE, Márcio Rossato. Medicinal plants used in

municipality of Palmeira das Missões, RS, Brazil.**Brazilian Journal of Biosciences**, Porto Alegre, v. 11, n. 3, p. 338-348, Jul./Sept. 2013. Available at: https://seer.ufrgs.br/index.php/rbrasbioci/article/view/115518/62795. Accessed on: January 8, 2025.

BRAZIL. Ministry of Health. National Policy on Medicinal Plants and Phytotherapeutics. Brasília: Ministry of Health, 2006. Available at: https://bvsms.saude.gov.br/bvs/publicacoes/politica_programa_nacional_plantas_medicinais_fitoterapicos.pdf Accessed on: January 24, 2025.

BRAZIL. Ministry of Health. Secretariat of Health Care. Department of Primary Care. Integrative and complementary practices: medicinal plants and phytotherapy in Primary Care/Ministry of Health. Secretariat of Health Care. Department of Primary Care. – Brasília: Ministry of Health, 2012. Available at: https://bvsms.saude.gov.br/bvs/publicacoes/praticas_integrativas_complementares_plantas_m edicinais_cab31.pdf Accessed on: January 24, 2025.

BRUNING, MCR; MOSEGUI, GBG; VIANNA, CM de M. The use of phytotherapy and medicinal plants in basic health units in the cities of Cascavel and Foz do Iguaçu - Paraná: the view of health professionals.**Science & Public Health,**v. 17, n. 10, p. 2675-2685, 2012. Available at: https://www.scielo.br/j/csc/a/z6RsN7j4bRKfM8Lq8tQNX4N/abstract/?lang=pt . Accessed on: January 24, 2025.

CARDOSO, AII, and MAGRO, FO, eds. Hortas: under a look you have never seen [online]. São Paulo: Editora UNESP, 2021, 99 p. ISBN: 978-65-5714-057-4. https://doi.org/10.7476/9786557140574 .

CARVALHO, LM Technical guidelines for the cultivation of medicinal, aromatic and condiment plants. Aracaju: Embrapa Tabuleiros Costeiros, 2015. 70 p. (Documents / Embrapa Tabuleiros Costeiros, ISSN 1678-1945). Available at: https://www.infoteca.cnptia.embrapa.br/infoteca/bitstream/doc/1028982/1/CT70.pdf Accessed on: January 24, 2025.

COSTA, LCB; PINTO, JEBP; CASTRO, EM; BERTOLUCCI, SKV; CORRÊA, RM; REIS, É. S.; ALVES, PB; NICULAU, ES Types and doses of organic fertilizer on growth, yield and chemical composition of essential oil of*Ocimum selloi*. **Rural Science**, Santa Maria, v. 38, n. 8, p. 2173-2180, Nov. 2008. Available at: https://www.scielo.br/j/cr/a/C4VVLJXxWm7pBBRjkDqR9dQ/?format=pdf&lang=pt Accessed on: January 24, 2025.

DEMATTÊ, José Luiz Ioriatti; DEMATTÊ, José Alexandre Melo. Management of sandy soils: fundamentals and applications. University of São Paulo. Luiz de Queiroz College of Agriculture, 2024. DOI: https://doi.org/10.11606/9786587391496 Available in:www.livrosabertos.abcd.usp.br/portaldelivrosUSP/catalog/book/1403?utm_source=chatg pt.com . Accessed on January 23, 2025.

GARLET, TMB Native medicinal plants of popular use in Rio Grande do Sul. Santa Maria, RS: UFSM, PRE, 2019. 1 e-book: il. (Extension Series). 104 p. Available at: https://www.ufsm.br/app/uploads/sites/346/2019/12/Cartilha-Plantas-Medicinais.pdf. Accessed on: January 8, 2025.

GUARIM NETO, Germano; MORAIS, Ronan Gil de. Medicinal resources of species from the Cerrado of Mato Grosso: a bibliographic study.**Brazilian Botanical Act**, v. 17, n. 4, p. 561-584, 2003. Available at: https://www.scielo.br/j/abb/a/n7MYRxm33WnsQRXzbZV5zTQ/?lang=pt . Accessed on: January 24, 2025.

GUEDES, Rodrigo CM; NOGUEIRA, Natália GP; FUSCO-ALMEIDA, Ana M.; SOUZA, Cláudia RF; OLIVEIRA, Wanderley P. Antimicrobial activity of crude extracts of Petiveria alliacea L.**Latin American Journal of Pharmacy**, v. 28, n. 4, p. 520- 524, 2009. Available at: http://www.latamjpharm.org/trabajos/28/4/LAJOP_28_4_1_7_AIT6W1N9TT.pdf. Accessed on: January 8, 2025.

HEREDIA ZÁRATE, NA; VIEIRA, MC Home gardens, medicinal plants and UFGD: volunteer work. Dourados: UFGD, 2016. Available at: https://dialnet.unirioja.es/descarga/articulo/5832642.pdf . Accessed on: January 24, 2025.

LIMA, SMG de; LIMA, AF de.; DONAZZOLO, J. Rescue of popular knowledge and use of medicinal plants in health promotion in Sananduva, RS. Porto Alegre,**Brazilian Journal of Agroecology**, v.2, n.1, Feb. 2007. Available at:https://revista.abaagroecologia.org.br/cad/article/view/1917 Accessed on: January 24, 2025.

MACHADO, CV; OLIVEIRA, CB; CZERMAINSKI, SBC Medicinal plants booklet of the Intersectoral Policy for Medicinal Plants and Phytotherapeutics of Rio Grande do Sul: APLPMFITO/RS Project. Porto Alegre: ESP/SES/RS, Department of Primary Care and Health Policies; Department of Pharmaceutical Assistance, Health Department of Rio Grande do Sul, 2021. 16 p.: ill. Available at: https://saude.rs.gov.br/upload/arquivos/202112/23154715-cartilha-das-pm-da-pipmf-projetoaplpmfito-rs-2021.pdf Accessed on January 8, 2024

MAROUELLI, WA; OLIVEIRA, AS de; COELHO, EF; NOGUEIRA, LC; SOUSA, VF de. Irrigation water management. In: SOUSA, VF de; MAROUELLI, WA; COELHO, EF; PINTO, JM; COELHO FILHO, MA (Ed.).*Irrigation and fertigation in fruit and vegetable crops*. Brasilia, DF:**Embrapa Information Technology**, 2011. Chap. 5, p. 158-232.

MATOS, Francisco José de Abreu. Living pharmacies. 5th ed. Fortaleza: Publisher**UFC**, 2024. (Commemorative edition of the 70th anniversary of the creation of the Federal University of Ceará).

BROWN, Chris; *Medicinal plants: cultivation and therapeutic use*. Federal Institute of Education, Science and Technology of Bahia, Governador Mangabeira Campus, Ministry of Education, 2021. Project

Medicinal Plants at School (PlaME). Available at: https://www.ifbaiano.edu.br/unidades/gmb/files/2021/04/Cartilha-PLAME-2.pdf Accessed on: January 7, 2025

PAULERT, R. et al. Medicinal plant garden: didactic model as a contribution to university extension.**Extension in Focus Magazine**, n. 27, p. 72-85, 2022. Available at: https://revistas.ufpr.br/extensao/article/view/83307 Accessed on: January 7, 2025

PAULUS, D. et al. Evaluation of organic substrates in the production of mint seedlings (Mentha gracilis R. Br. and Mentha x villosa Huds.).**Brazilian Journal of Medicinal Plants**, v. 12, n. 4, p. 427-433, 2010. Available at: https://www.scielo.br/j/rbpm/a/mj43vGyTscGk58VR69QXvzg/ . Accessed on: January 24, 2025.

REIS, Lais Naiara Gonçalves dos; PORFÍRIO, Lais Moraes de Oliveira; MARTINS, Marco Túlio; OLIVEIRA, Thiago Sardinha de; RIBEIRO, Natália Jardim; CORRÊA, Sílvia Luciane. Xixá Living Pharmacy: Survey of the number of producers interested in the production of medicinal plants in the region of Itapuranga-GO. Technical Bulletin. Itapuranga: UEG, 2024.

REIS, Neville VB dos. Construction of greenhouses for vegetable production in the North, Northeast and Central-West regions. Brasília, DF:**Embrapa Vegetables**, 2005. 38 p. (Technical Circular, 38). Available at: https://www.embrapa.br/documents/1355126/9124396/Constru%C3%A7%C3%A3o+de+estu fas.pdf . Accessed on: January 23, 2025.

RIBON, Adriana Aparecida; SILVA, Adrielly Rosa da; REIS, Lais Naiara Gonçalves dos; PORFÍRIO, Lais Moraes de Oliveira; MARTINS, Marco Túlio; RIBEIRO, Natalia Jardim; CORRÊA, Silvia Luciane; OLIVEIRA, Thiago Sardinha de. Medicinal Plants: Economic Viability for the Municipality of Itapuranga-GO. Technical Bulletin. Itapuranga: UEG, 2024.

SANTOS, AF; SANTOS, AF Medicinal garden: scientific and pedagogical contributions to chemistry teaching.*Athena Publisher*, 2021. Available at:
SANTOS, Maria Luana dos; SANTOS, Raquel Belchior Ferreira dos; SILVA JUNIOR, José Luíz da; SANTOS, Magnolia Carla Conceição dos; Medicinal garden: scientific and popular contributions in the school environment. In:*Science in Motion from Teaching through Research*. UNEAL: State University of Alagoas, 2023. Available at:

https://www.researchgate.net/publication/372123210_Horta_medicinal_contribuicoes_cientific_e_populares_no_ambito_escolar . Accessed on: January 24, 2025.

SILVA, Ana Paula Costa. Medicinal plants: benefits, toxicity and possible interactions (aloe vera, boldo, Ora-pro-nobis). 2021. Final course work (Bachelor's degree in Pharmacy) — University of Uberaba, Uberaba, 2021. Advisor: Prof. Ms. Tatiana Reis Vieira. Available at:

https://dspace.uniube.br:8443/bitstream/123456789/1592/1/ANA%20PAULA%20COSTA%20SILVA.pdf Accessed on: January 8, 2025.

SILVA, LFR et al. Medicinal plants: an approach to safe and rational use. **Physis: Journal of Public Health**, v. 31, n. 2, e310218, 2021. Available at: https://www.scielo.br/j/physis/a/kwsS5zBL84b5w9LrMrCjy5d Accessed on: January 24, 2025.

SILVA, Marizelda Rael da. The use of knowledge of medicinal plants as a tool to stimulate environmental preservation.**Journal of Environmental Monographies**, v. 6, n. 6, p. 1354-1380, 2012. Available at:https://periodicos.ufsm.br/remoa/article/view/4791 Accessed on: January 24, 2025.

SINGAB, Abdel-Naser B.; EL-HEFNAWY, Hala M.; ESMAT, Ahmed; GAD, Haidy A.; NAZEAM, Jilan A. A systemic review on the pharmacological profile of Aloe arborescens: biological activities and pilot clinical trials.**Phytotherapy Research**, [sl], v. 29, n. 12, p. 1858-1871, 13 Oct. 2015. Available at:https://docs.bvsalud.org/biblioref/ses-sp/2012/ses-26941/ses-26941-3996.pdf . Accessed on: January 8, 2025.

SOUSA, DMG; LOBATO, E. (Ed.).*Soil correction and fertilization in annual and perennial crops*. 2nd ed. Planaltina, DF:**Embrapa Cerrados**, 2004. 416 p.

SOUZA, OI; OLIVEIRA NETO, AR; PINTO, MA; SILVA, IR; MORAES, SC; GOMES, ML Pharmacological activities of rue (*Ruta graveolens*). In:**BRAZILIAN ECOLOGY CONGRESS,**8., 2007, Caxambu, MG. Proceedings [...]. Caxambu: [sn], 2007. Available at: http://www.seb-ecologia.org.br/revistas/indexar/anais/viiiceb/pdf/577.pdf Accessed on: January 8, 2025

LUCENA, Ailton Guilherme de.**Medicinal plants**. Brasília, DF: Emater-DF, 2015. Available at:

https://biblioteca.emater.df.gov.br/jspui/bitstream/123456789/97/1/Plantas%20medicinais.pdf Accessed on: January 7, 2025

TERRA JUNIOR, Orlando Nascimento; MALDONADO, José; ARNÓBIO, Adriano. Study of the Commercial Performance of Plant Pharmaceutical Inputs from the Perspective of Foreign Trade. **Fitos Magazine**, Rio de Janeiro, v. 9, n. 3, p. 233-246, Jul./Sept. 2015. Available at: https://www.arca.fiocruz.br/handle/icict/19237 Accessed on: January 7, 2025

ACKNOWLEDGMENTS

The authors would like to acknowledge the financial support of the Technological Colleges of the State of Goiás (COTEC), Federal University of Goiás (UFG), Center for Education, Work and Technology (CETT) of UFG, Educational and Cultural Radio and Television Foundation (FRTVE), in partnership with the State Secretariat for Recovery (SER) and the Government of the State of

Goiás, through Agreement No. 01/2021 - SER (Process No. 202119222000153) through COTEC/CETT/SER Research Notice No. 03/2023.