Environmental ethics at an intercultural garden (Scientific initiation in sustainability)

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ABSTRACT

This chapter represents the historical record of the stages of the third management of the intercultural didactic garden (medicinal and sensory) in a courtyard used by the Homeopathy Service, located in the 7th Infirmary of the Hospital Geral Santa Casa da Misericórdia in Rio de Janeiro/Brazil, whose elaboration was inter - transdisciplinary and intersectoral, voluntary and cooperative, with the purpose of cultural appreciation and intercultural and interethnic experience, as a way of promoting well-being and mental health through the preservation of intangible heritage, which is the knowledge of the people. The doctor and naturalist, who brought Homeopathic Medicine to Brazil at that time, cared for members and families of traditional ethnic communities and enslaved indigenous peoples or, when they no longer served, those left to fend for themselves. Therefore, from this stage completed in primary care, scientific initiations were carried out with the plant elements of the Benoit Jules Mure medicinal garden, ranging from in situ morphological knowledge to the pharmaceutical process using the Hahnemannian method of multiple bottles, to investigate circumscribed environmental issues . Scientific investigations were started with Calendula officinalis, Euphorbia tirucalli, Annona muricata. For the present stage described here, the

germination of Cowpeas (Vigna unguiculata) was investigated, originating from Africa and used to this day by Quilombola Traditional Knowledge, selected based on a bibliographical review. Cowpea grown in this garden in cups with an high ultra-diluted and energized (HUD) 5DH Sulphur solution, as directed for organic garden cultivation in Rio de Janeiro, has broad potential for clinical scientific research in nutrition and the environment, also for phytoremediation. This study, with the use of streamlined solutions, thus contributed to expanding the perception regarding the positive and enriching role of cultural diversity and also biodiversity, helping both to reduce the risk of food shortages for those in urban situations in Rio de Janeiro, as well as in awareness of ethical behavior of care for everything that makes up the environment (Environmental Ethics) and Cultural Competence.

Keywords: Didactic garden management, Euphorbia tirucalli, Vigna unguiculata, HUD 5DH Sulphur, Family psychosocial care for traditional communities.

1 INTRODUCTION

For 21 years, plant oxidative stress has been investigated by our research group in the face of nature's harsh elements, which lead to the demineralization of plants and, sometimes, lead to a cancerinic with desmineralization state that triggers weakening, which, in turn, allows the entry of nematodes and other organisms, not only causing gall diseases but several others. So, as there's no solution for so many cases, novel models of investigation were introduced with high ultradiluted and sucussioned – HUD - solutions (KUSTER et al., 2002; VARRICCHIO et al., 2006; 2022; GASPAR et al., 2022).

At the same time, after vegetal biotechnological research (VARRICCHIO et al., 2008), as a retributive task in bioethics, educational measures to environmental health for the community were carried out (GASPAR et al., 2017; GASPAR, 2018; GASPAR et al., 2020; GASPAR & RONCARATI, 2021; GASPAR et al., 2023; DELAUNAY DE SOUZA et al., 2023), through Environmental Health, Parasitology, Bioethics Project of the Immunoparasitology and Toxicological Analysis Laboratory of Faculty of Pharmacy of Federal University of Rio de Janeiro (SAPB/LIPAT/FF/UFRJ Project - https://sites.google.com/view/lipat/sapb), the team focused on actions in primary health care via health education, also to members of traditional ethnic communities and to indigenous (originary people) – in urban situations in Rio de Janeiro (MUSMANNO et al., 2019; WASIM et al., 2020, 2021).

In accordance with higher education (DCN, 2014) and the environmental aspects mentioned in the new Code of Medical Ethics (2018), over years we have taken this traditional knowledge to universities for intercultural changes in cultural didactic events held in jointly by SAPB-LIPAT/FF/UFRJ Project, by the professor of the curricular unit Traditional Knowledge and Associated Rights of the INPI postgraduate course, and by the Laboratory of Studies on the Aging Process of the Institute of Psychiatry of the University of Brazil/UFRJ (PROVE – MEPPSO/IPUB /UFRJ (VARRICCHIO & LAGE, 2020; VARRICCHIO, 2022).

Society lives under the oppression of a great discomfort (WHO, 1986; IBGE, 2020). Sensibilization environmental activities were carried out at the local level with Homeopathy professionals, based on the understanding of paragraph 9 of the Organon of the Art of Healing written

by Samuel Hahnemann (1831 In PUSTIGLIONE & CARILLO JR., 1994). Through creation of an intercultural garden which once social spread occurred through citizen actions and could bring or, even rescue, the subjective feeling of well-being for many "differents", in society, at Homeopathy Service at 7a Ward in General Hospital Santa Casa da Misericórdia do Rio de Janeiro/Brazil (HGSCM_RJ) with it's garden, a health space.

2 GOAL

Describe the steps taken in education for sustainability through the planning of the teaching garden, Intercultural Garden Dr. Benoit Jules Mure ("Garden from everywhere to everyone") that raise awareness and develop environmental ethical competence.

3 METHODOLOGY

Case study (report of the historical process over the years – VENTURA, 2007).

4 RESULTS

During three years of studies, other issues related to traditional knowledge people raised and were also addressed (KOTTOW, 2011; GASPAR et al., 2017; GORINI et al., 2020). Since 2018, at the Homeopathy outpatient clinic at HGSCM-RJ, we have taken part of this previously formed traditional work group, so that they could be part of the construction of this intercultural experience based on the principles of clinical bioethics: The intercultural didactic garden (GASPAR et al., 2022). Other two gardens previously prepared by our group within other traditional communities served as inspiration for the first garden planned and organized for the courtyard of the Hospital Geral Santa Casa da Misericórdia in Rio de Janeiro, used by the Homeopathy Service of the 7th Ward opened in 2020.

However, the movement of nature itself after the return of the period of social isolation during the pandemic, determined a second one better designed garden, which emerged in the same place because the environmental awareness activities and the education for sustainability and environmental ethics had started in person and continued through online hybrid teaching at hidden curriculum (MACHADO-Duigó-TUKANO et al., 2019). Therefore, we went through the stages of Intercultural Garden I (2020) and II (2021) (GASPAR et al., 2022).

5 INTERCULTURAL GARDEN III - DR. BENOIT JULES MURE - 2023:

Environmental educator Sandra Ávila Gaspar and her team of employees were responsible for adapting the soil conditions, gracefully to Santa Casa, aiming for the necessary replanting. In parallel, work was carried out to revitalize the site (painting renovation and restoration of installations from the colonial period) so that, on April 10, 2023, the work on the garden designed with people and ethnic

communities in an urban situation since 2018, updated during this period, was reopened and received the name of honorable Dr Benoit Jules Mure, a french physician who took care of slavery people in Rio de Janeiro/Brazil (GASPAR et al., 2024).

The stages of revitalization of Intercultural Garden III show the dynamics of this type of work process, perceived by us as a continuum of cultural exchanges and adjustments to the climatic and environmental conditions that arise. The soil was cared for and enriched in accordance with the cultivation guidelines in agrohomeopathy (DUTRA, 2012 In GASPAR et al., 2022; 2024).

Objective of this article, the following species with established medicinal actions were sown and, some, replanted, between 2023 February and March (Table 1), regarded the potential for local topical application as already described in the scientific literature, but this time, also considering plant biotechnological potential to investigations on environmental health, such as mosquito and nematodes control, besides environmental restoration (natural products and HUD as fertilizers, to germination):

Table 1: Cultivation of the Intercultural Garden III - Dr. Benoit Jules Mure - in February-March 2023. Plant biotechnological potentials of the selected species.

Popular Name	**Scientific Name**	**Source/ Etnobothanic Traditional Use**	**Medicinal Use**	**Topic Use**	**Environmental Potential**
Açucena	*Hippeastrum hybridum*	South America /Indígenous Amazon	NF	Skin lesions Boils	NF
Alecrim	*Rosmarinum officinalis*	Mediterranean, Central Europe/Italian	Digestive	Antitinflamatory	NF
Alfavaca	*Ocimum basilicum**	Africa,Asia/Indigenous Brazil N e NE	Digestive	NF	NF
Alfazema	*Lavandula latifolia*	Mediterran/ Temperate regions	Antiespasmodic	NF	NE
Aroeira	*Schinus terebenthifolius*	Native - SP - Ribeira Valley/ Indigenous	Antimicrobian	Healing	NF
Aveloz	*Euphorbia tirucalli*	Africa and the Middle East	Antineoplastic	Anti-warts	NF
Babosa	*Aloe vera*	Africa and the Middle East	Antioxidant	Strengthening hair strands	NF
Beijo	*Impatiens walleriana*	Africa/Etnias	Diuretic, Catartic	NF	NF
Boldo de quintal	*Plectranthus barbatus*	Africa Asia	Digestive	NF	NF
Boldo do Chile	*Peumus boldus*	Africa, Asia, Europe, Andes, Brazil/Indígenous	Digestive	Antiparasitic	NF
Capim limão	*Cymbopongo citratus*	India	Muscle relaxant	Antifungal	Repelente insetos
Confrei	*Symphytum officinalis*	Europe, Mediterranean	NF	Antiinflamatory	NF
Cúrcuma	*Curcuma longa*	Asia	Imunomodulator, Antiviral	Antiinflamatory	NF
Elevante	*Mentha viridis*	Europe	Antiespasmodic	NF	Antihelmíntica
Erva-cidreira	*Melissa officinalis*	Mediterranean, Middle East/Arabian	Digestive, sedatif	NF	NF
Erva doce	*Pimpinella anisum/ Foenicum vulgare*	Mediterranean, Asia, Africa, Europe	Anti-espasmodic	Muscle relaxant	NF

Gengibre	*Zyngiber officinalis*	India, China	Imunomodulator, Adaptogen	NF	NF
Graviola	*Annona muricata*	Central America, Peruan Valley, Brazil	Pain. Constipation. Antioxidant	NF	Seeds: Anthelmintic Insecticide
Guaco	*Mikania glomerata*	Native	Respiratory system	NF	Venomous animal bites
Guiné	*Petiveria tetrandra* *	Americas/Indígenous	NF	Healing Antifungal Insect bites Antiofidic	NF
Hortelã pimenta	*Mentha piperita*	NF	Digestive Analgesic Vermifugous	Oral Antiseptic Insect bites	NF
Jaboticaba	*Plinia cauliflora*	South America	Diarrheia	Oral Antiseptic	NF
Louro Grego	*Laurus nobilis*	Mediterranean, Europe	Digestive	NF	NF
Mangueira	*Mangifera indica*	India	Anemia Cough	Oral Antiseptic Varicous ulcers	NF
Manjericão	*Ocimum basilicum*	Asia, Africa	Cough Headache	Antiseptic	Antifungal
Marcelão	*Achyrocline satureioides**	LatinAmerica/Indigenous	Abdominal pain	Hair lightener	NF
Menta	*Mentha spp*	Asia	Antiviral Expectorant	Antifungal Analgesic	Antifungal
Mirra	*Commiphora myrrha*	Africa, Israel, Middle East, India,Tailand	Antiinflamatory	Oral Antiseptic	NF
Neem	*Azadirachta indica*	Asia	Imunomodulator, Antiviral	Eczema, Psoriasis	Control pests Anthelmintic Fertilizer
Noni	*Morinda citrifolia*	Asia	Urinary infections	Boils	Pediculosis Tickicide
Onze horas	*Portulaca grandiflora*	South American	Anemia	Burns	NF
Ora pro nobis	*Pereskia aculeata*	Americas	Anemia	Healing	Tripanocide
Orégano	*Origannum vulgare*	Mediterranean, Europe, Asia	Adaptogen Antimicoplasm, Anti *Listeria monocytogenes*	Antifungal	NF
Pimenta biquinho	*Capsicum chinense*	Americas	Analgesic	NF	NF
Pinha (Fruta de Conde)	*Annona squamosa**	Americas	Antiinflamatory Muscle relaxant	Muscle relaxant	NF
Pitanga	*Eugenia uniflora*	Native Atlantic Forest /Tupi Indigenous	Fever, Headache	NF	NF
Poejo	*Mentha rulecium*	Asia	Respiratorysystem	Antiseptic	NF
Romã	*Punica granatum*	Oriental Mediterranean Middle East,	Imunomodulator, Antineoplastic, Memory Stimuly	Healing Oral Antiseptic	NF
Saião	*Kalanchoe pinnata*	SouthAfrica, Madagascar, Asia	Antiinflamatory Respiratorysystem	Skin ulcers	NF
Salsa	*Petroselium crispum*	Central Mediterranean	Digestive; Anti-hipertensive,	Antiinflamatory	NF
Terramicina	*Alternanthera brasiliana*	South, Latin America	Respiratorysystem	Antiseptic	NF
Tomilho limão	*Thymus citriodora*	Europe, North Africa, Asia	Respiratorysystem	Acne	NF

Urucum	*Bixa orellana*	Tropical America	Antioxidant Vermifugous Antitinflamatory	Sun Protector, Insect Bites	NF

Source: MURE* (1849); BRANCH et al. (1983) & BORGEA (1991) In LAMEIRA (2011); BR/MS/SUS (2006), Phytotherapeutic Formulary of the Brazilian Pharmacopoeia (FFFB, 2021). EMBRAPA. GONÇALVES et al. (2021). Legend: NF – Not Found.

So, Intercultural Garden III (also referred to as Ethnic Garden, Hope Garden, Health Garden) was reopened on 10.04.2023 in honor to disciple of Samuel Hahnemann and naturalist, Benoit Jules Mure, the first to produce books on homeopathic medicines obtained from Brazilian biodiversity (MURE, 1849). So, scientific initiation of undergraduated students had began. Sensorial intercultural didactic garden offers bean, fruits (mango, conde fruit, jabuticaba, lemon and soursop), flowers and bouquet, besides well being (GASPAR et al., 2024).

The crude latex, the total aqueous extract from a specimen of *Euphorbia tirucalli* (Fire stick) from garden of Product Natural Research Institute *situ* at Ilha do Fundão Campus of Federal University of Rio de Janeiro (IPPN/UFRJ) and HUD 30CH from the total aqueous extract from a specimen *situ* at UFRRJ/Seropedica Campus were not cytotoxic against the MCF7 lineage of human breast adenocarcinoma and nor to Melan A lineage of normal melanocytes. Worthy of note, HUD 5CH, 15CH and 30CH obtained from crushing the latex of the IPPN/UFRJ specimen, previously tested in the same lineages, were cytotoxic and still capable of selective action only in tumor lineage, including a significant ($p<0,05$) modification in glycolytic enzymes pathway metabolism detected (AQUINO et al., 2008).

There were no action of these pharmacotechnical preparations on the apoptosis pathways. Very important was lack of activity in protein expression at Bcl-2 pathway because it excluded the anti-apoptotic action of the three extracts tested. The Bcl-2 family of proteins plays a critical role in regulating apoptosis in both physiological and pathological conditions. Some of these proteins, such as Bcl-2 and bcl-XL, bcl-w, mcl-1 and A1, are anti-apoptotic, while others, such as bax, bad and bid are pro-apoptotic (THOMPSON, 1999). So, these extracts didn't were able to induce cell proliferation. Bax pathway, pro-apoptotic through the mitochondrial route, was negative for the three pharmacotechnical preparations tested (VARRICCHIO et al., 2019).

While the CD95 pathway was negative for raw latex in a total of three experiments. However, cell membrane labeling was positive in the first assay analyzed by confocal microscopy and subsequently negative for the other two. The detection of chemical components and their variable concentration through HPLC/UV analysis could then explain such variation in plant chemical production as a secondary effect to seasonality (VARRICCHIO et al., 2019), thus justifying the following micropropagation step. It's well known that quality control of a herbal medicine is not found in the laboratory like synthetic medicine, but in its plant chemical production obtained through the chosen and used crop (VARRICCHIO et al., 2019a).

Returning to the writings of Hippocrates (460-370 BC) who already stated: “Let food be your medicine and the medicine is its food”, scientific initiations were initiated with *Euphorbia tirucalli* – stick of fire (MUSMANNO et al., 2019) and went on with *Calendula officinallis* (MARTINS et al., 2022, a), *Annona muricata* - soursop/graviola (GASPAR et al., 2024) besides other aspects related to fruits and nutrology (OLIVEIRA et al., 2019; GONÇALVES et al., 2021; BELLIZZI et al., 2022; WENDLING DA SILVA et al., 2023; CRUZ FILHO et al., 2023; HANSEL – MARTINS et al., 2023; 2024).

Soursop has medicinal characteristics in several of its compounds, marked its notorious anti-inflammatory and antitumoral action. Numerous studies aim to isolate the compounds present in the fruits, peels, seeds and roots of soursop with the purpose of identifying new molecules with antitumor action. To date, there are 212 bioactive compounds, such as acetogenins and alkaloids that have anticancer, anthelmintic and insecticidal action, however, in high doses it has neurotoxic action. Several studies involving soursop compounds, such as acetogenins, alkaloids and phenols, have revealed chemopreventive and chemotherapeutic reactions against cancer cells. According to the historical context of use of this fruit, there is potential future participation in the prevention and treatment of cancer (DAL'COL FROIS & LEIRIA, 2019).

Not listed as HUD solution in brazilian homeopathic pharmacopea (FHB, 2022), nevertheless, this review suggested the broad potential for studying this fruit cultivated in the intercultural didactic garden III, for guidance for monographs and course completion works, both: in its anti-inflammatory potential for local application, or in its environmental, antiparasitic and insecticidal, potential (GASPAR et al., 2024).

As plan research, we intend to evaluate biological effects in the development of this fruit besides black bean and Cowpea bean, cultivated in pots at this garden when under some HUD solutions prepared from minerals as official guides (DUTRA, 2012), each mineral per time evaluated (BELLIZZI et al., 2022).What do we know about Cowpea bean?

Cowpea (*Vigna unguiculata* (L.) Walp.) has African origin, arriving in Brazil through colonizers in the state of Bahia in the middle of the 16th century (FREIRE et al., 2018). It has great relevance from a socioeconomic point of view, with its culture being quite common in the Northeast and North regions of the country (SOUZA, 2018), being a component of the population's usual diet, especially in rural areas, where its culture aims to constitute the income and guarantee own consumption of producing families (FREIRE FILHO et al., 2005; FROTA et al., 2008).

It also stands out for its great nutritional value, high amount of proteins, as well as its functional role due to its dietary fibers, which help regulate the lipid and glycemic profile. It also presents complex carbohydrates and phenolic compounds, producing high antioxidant activity (SILVA et al., 2009). The phenolic compounds (phenolic acids and tannins) present in it are factors that limit its consumption by

reducing the solubility of some minerals by forming some complexes, but these same compounds are of great benefit, as they act as antioxidants, preventing cardiovascular diseases and cancer of such prevalent diseases, whose incidence has been rising (OLIVEIRA & MAIA, 2022).

Cowpea (*Vigna unguiculata* (L.) Walp.) is a bean that stands out for its great nutritional value, in addition to having phenolic compounds that act as antioxidants, and can contribute to the prevention of various diseases, including Cancer. Oncological disease and its treatment cause changes that affect the patient's intake and eating habits. According to the WHO, it is estimated that new cases of Cancer will increase by up to 70% in the coming decades (SOUSA DA SILVA et al., 2022).

Beans contain a wide range of bioactive compounds such as flavonoids, anthocyanins, proanthocyanidins and isoflavones, as well as some phenolic acids. The antioxidant mechanism of phenolic compounds can be summarized as a transfer based on hydrogen atoms or a single electron transfer through protons. The ability of polyphenols to reduce the risk of developing several chronic non-communicable diseases linked to oxidative stress, including cancer, can be explained both by the presence of reducing polyphenols and their metabolites in plasma (SOUSA DA SILVA et al., 2022).

However, it is a bean that is difficult to germinate and survives little, often acquiring diseases, the most worrying being the Severe Mosaic Disease virus, which kills the crop, so, a proposal in plant biotechnology had been established by our research group (VARRICCHIO, KUSTER, LAGE & BRIOSO, 2007 In GASPAR et al., 2017). Nevertheless, there are other interesting biotechnological research to application of *Cowpea mosaic virus* (CPMV).

Cowpea mosaic virus (or CPMV), is a comovirus that affects the flowers of the cowpea plant, is harmless when inserted into the body of a mammal - and by extension, into that of a human. However, the pathogen evokes a potent immune response, stronger than other viruses of plant origin. At a certain point, the immune system realizes that the cowpea virus is inside a tumor and begins to fight the cancer cells (DUVAL et al., 2020).

Injected directly into cancer cells, it works as a danger signal so that the body, believing it is fighting infected cells, acts against the carcinoma. CPMV has only been tested in dogs. The viral treatment was applied to 6 cases of mouth cancer, a condition that can lead to the death of the animal and whose chances of recurrence are high - 85% of cases. Combined with radiotherapy, the team injected four doses of 200 micrograms of a modified version of the virus (three times more concentrated than a flu vaccine) into their canine patients over the course of two weeks. None of the six presented the tumor again (DUVAL et al., 2020).

In 2015, a study led by immunologist Steve Fiering had observed good results from the same comovirus in models of melanoma, breast, ovarian and colon cancer in mice. The pathogen works as a warning against cancer cells and is capable of making the immune system also fight metastasis. For

now, only three oncological viral treatments have the approval of health departments around the world - two against melanoma, and one that acts on cases of neck and head cancer (DUVAL et al., 2020).

This immunotherapy has been shown to be capable of launching a coordinated immune response against any metastatic and future tumors. Furthermore, it was positive in laboratory rats and dogs with different types of cancer, from melanoma (skin) to sarcoma (connective tissues). Thus, combining HFRT with immunoactive agents such as CPMV could enhance the overall therapeutic effect. In particular, we hypothesize the combination will lead to a larger cytotoxic immune response, ultimately improving efficacy *via* up-regulation of apoptotic pathways and immune cell activation, both cytotoxic natural killer cells and cytotoxic T cells (DUVAL et al., 2020).

It was not understood why the cowpea virus was a potential weapon against cancer and other pathogens affecting legumes were not. Then, its action was compared to that of the cowpea severe mosaic virus and the tobacco ringspot virus. The three were injected into mice in three doses given seven days apart. As expected, those who received the cowpea virus had a higher survival rate and the tumor stopped growing four days after the second dose. Immune cells were extracted from mice for analysis. The cowpea virus triggers a more intense inflammatory response, which evokes the immune system's response to the tumors (BEISS et al., 2022).

5.1 ATTENDED CULTIVE OF *VIGNA UNGUICULATA* ELICITED WITH *E.TIRUCALLI* EXTRACT AND HUD 5CH SULPHUR AS ELICITORS: BIOTECHNOLOGICAL POTENTIAL ON BIOREMEDIATION?

Euphorbia tirucalli L. is a succulent native to the African continent but it's widespread for all other continents, used since 8000 b.C. Despite toxic latex, it's used by original peoples as analgesic and tumoral reductor, and it's antioxidant, antineoplasic and immunomodulatory activities were already verified (BETANCUR-GALVIS et al., 2002; 2003). Varricchio (2005) verified citotoxicity to B16F10 Melanome murine MDR (resistent to multiple drugs) to both: fresh raw latex and ethanollic extract, but it's toxicity is related to strong oxidative stress caused by latex, which is able to induct cellular membrane and vegetal wall lesions (VARRICCHIO et al., 2019). In turn, *Vigna unguiculata* (Caupi Bean) is the bean with the highest concentration of iron and proteins still used by quilombolas and northeastern people in Brazil (GASPAR et al., 2017; MUSMANNO et al., 2019).

The assay aimed to evaluate the biological effect of the total ethanolic extract 30% *E. tirucalli* and HUD 5DH Sulfur on the germination of cowpea (*V. unguiculata).* As methodology, assisted cultives of *V. unguiculata* in 200 ml of mineral water were carried out. Three seeds per pot, in three pots, in triplicate per row, with one more pot (N = 30). It was administered separately: 1 drop of total extract of *E. tirucalli*, HUD5DH, and respective controls prepared by the Hahnemannian method of multiple flasks. The action/time curve was verified on the first, third and seventh day of cultive: pH,

free chlorine, total alkalinity, color, turbidity and presence of cyanuric acid were measured by the colorimetric method. Temperature measured by an Infrared thermometer B-Max. Morphology and germination were observed by ANOVA statistical programme.

Results showed that it had an inhibition on the germination of *V. unguiculata* ($p<0,05$), curiously associated with engorgement of the seeds, an evidence of metabolic route deviation. Hormetic ponderal phytoextracts with also HUD 5DH Sulfur test solutions, induced cyanuric acid at water where seeds were suggestive of protein breakdown, possibly due to erosion of the bean skin. Cyanuric acid is commonly used as pesticide, mosquito inseticide and mainly as a repellent of invasors plant species and their microbiological pathogens, through allelopathy mediated by radicule secretions emissions by roots (BEZERRA, 2015; HANSEL – MARTINS et al., 2023).

Cyanuric acid is also able to compete with some chemicals. It is a precursor to polyesters, polyurethanes, bleaches, disinfectants and herbicides. This last function, in turn, can be used in plant biotechnology in the bioremediation of soils contaminated with herbicides, used to combat invasive weeds. So, this experiment will be repeated separately to further study the mechanisms. Under this vision, the use of herbal extracts and diluted solutions (infinitesimals) seeks to become an alternative for the cultivation of small farmers, reducing their exposure to insecticides and pesticides currently used in industry, such as organochlorines, which are considered endocrine disruptors (HANSEL – MARTINS et al., 2023) that can cause serious health problems, including mental disorders (HANSEL – MARTINS et al., 2024).

To conclude, a biotechnological potential for bioremediation of soils contaminated with herbicides, through nitrogen oxidative stress, was evidenced. Assays on this route will be carried out in phytopathology laboratory and cyanuric acid will be the pathogenetic marker of biological activity for HUD solution tested (GASPAR et al., 2024), as already evidenced at this present assay. Furthermore, herbal extracts and high ultradiluted sucussioned solutions may be an alternative to the cultive of small farmers, reducing exposure to pesticides.

Novel assays with raw extracts obtained from Cowpea bean of differents assisted cultive and micropropagation will go on being evaluated, about their mechanisms of action at MCF7 and Melan A lineages.

6 DISCUSSION

There are some definitions about Ethnobotany. Ethnobotany addresses the way people incorporate plants into their cultural practices and traditions (BALICK & COX, 1997). Ethnobotany studies the interrelationships between humans and plants in dynamic systems (ALCORN, 1995).

> “Ethnobotanical approaches
> can provide
> important answers

> so much for trouble
> biological conservation
> as for targeted questions
> for local development".
> (HANAZAKI, 2006, a)
> "

Recapitulating the path of structuring work in ethnobotany: Since 2003 we have worked in contact with people, listening to popular, regional and traditional reports, as a function of bioethics feedback from academic research with plant species of cosmopolitan dissemination, since Rio de January/Brazil is home to representatives of several peoples and ethnicities (VARRICCHIO et al., 2008; OLIVEIRA et al., 2019).

Due to this prolonged contact with the country's biodiversity and, especially, with the existing cultural diversity, it was realized how much both are disrespected or not valued, so, two lines of extension work were started. Research for Environmental Health, seeking remove local problems brought by the community and with their pro-active participation; in parallel the second line, with joint tasks to raise environmental awareness, through the teaching of environmental ethics through the master's feedback product prepared in partnership with an interdisciplinary group of teachers and community members, Environmental Awareness Primer (VARRICCHIO et al., 2003 In VARRICCHIO & PYRRHO, 2017; https://sites.google.com/view/lipat /sapb).

Since 2008, scientific initiations have been carried out, also for members of traditional and ethnic groups in urban situations in Rio de Janeiro, in cooperative and collaborative partnerships (MACHADO/Duigó-TUKANO et al., 2019; 2023). After years of listening to the needs highlighted by leaders and also their suggestions, protocols and strategies were developed in accordance with their worldviews and eco-perceptions (VARRICCHIO & LAGE, 2020), prioritizing this knowledge as an end in itself (MACHADO/Duigó-TUKANO et al., 2019; VACITE et al. , 2023; MACHADO/Duigó-TUKANO et al., 2023; CLER & VARRICCHIO, 2023; FREIRE SOUZA SILVA et al., 2023; KATHAR et al., 2023; CRUZ FILHO et al., 2023; DELAUNAY DE SOUZA et al., 2023, a; HANSEL MARTINS et al., 2023; 2024).

By this way, young, mature and elderly representatives of peoples and ethnicities who attend the school clinic: Pakistanis, Roma, Japanese, Hebrews, originary indigenous of the Tukano people, Satere-Mawe people, Caete people, Guarani people, together with physicians, all team cared by Jungian art therapists Cristiane Gerolis and Fabio Tavares, were able to show that they are beyond those spaces previously occupied during the period of colonization - exile and slavery (TAVARES & GEROLIS, 2019).

Culmination of this journey by the cultivation carried out by everyone together was recorded in videos (Homeopathy Service, JTL, 2021 - Part 1, Part 2, Part 3). So, there was an understanding of the

concrete return of the multisensory and multidimensional apprehension of their eco-perceptions regarding environmental ethics (MORAES et al., 2021; BELLIZZI et al ., 2022a).

In this feedback perspective from intercultural didactic clinical bioethics (KOTTOW, 2011), the team of art therapists voluntarily developed a project to raise awareness for inner reflection for the entire multi, inter and transdisciplinary team of the Benoit Mure Center at Homeopathy Service, employing common elements of plant species, working on their uses and the individual perspective on their subjective, singular meaning and worldview, such as corn, urucum, beans (VARRICCHIO & LAGE, 2020). The agronomic and cultural procedures and products generated in intersectoral partnership have already been communicated (GASPAR et al 2022).

7 INTERCULTURAL GARDEN III (2023):

From 2018 onwards, teaching outpatient clinic supported by Benoit Mure for Care, Assistance, Research and Studies Nucleus studied HUD from *Punica granatum* (Pomegranate), HUD from *Elaies guinensis* (Dendê) HUD from *Bixa orellana* (Urucum), among others. All of these homeopathic drugs exist in the Brazilian Homeopathic Pharmacopoeia, even authorized by MS/ANVISA. Indeed, they were used also as functional foods (BELLIZZI et al., 2022).

As a territorialized and intersectoralized service, it became a teaching outpatient clinic also aimed at people and ethnic communities in urban situations in Rio de Janeiro/Brazil, who reside around it (VARRICCHIO & LAGE, 2020; MACHADO/Duigó-TUKANO et al ., 2023; HANSEL MARTINS et al., 2024), and whose proactive participation of its leaders stood out (VACITE et al., 2023; MACHADO/Duigó-TUKANO et al., 2023; 2024).

Creation of a sensory garden with pharmacognostic utilities for plant studies and investigations with HUD drawing comparisons of effect in basic research, as already carried out (VARRICCHIO et al., 2006): botanical certification of plant species for research in plant cultives, inclusion and integration of people, welcoming and respecting the knowledge and their self-direction, process of choosing and sowing selected species, as *Calendula officinalis* (GASPAR et al., 2022; MARTINS et al., 2022, a ; HANSEL-MARTINS et al., 2023; 2024).

It is clear that today this intercultural garden does not correspond to a medicinal garden for the preparation of medicinal extracts (neither oral via, nor local use), since if it were, it would meet the requirements for a “living pharmacy” requiring the participation of a pharmaceutical professional for monitoring the chemical marking of plant production because of edaphoclimatic fluctuations. However, the cultivation organic standards for medicinal plants in the State of Rio de Janeiro were respected (DUTRA, 2012) as they were intended for research with HUD obtained from the pharmacotechnical preparation of these present specimens, for investigations of local environmental

solutions, evaluated both by biological markers and pathogenetical markers (HANSEL-MARTINS et al., 2022, a; 2024).

Socio-cultural and environmental activities were developed from a transcultural perspective to raise awareness among these garden users (VARRICCHIO et al., 2021). Previously, intersectionality in health was investigated to develop this work (MELLO & GONÇALVES, 2010): social class, color, gender, ethnicity (GONÇALVES et al., 2019; 2020; 2021; MENDES et al., 2021; 2022; VARRICCHIO et al., 2023). While regarding social determinants and their impacts on health: invisibility, inequity, racism, they were discussed by the representatives of ethnicities, peoples and collectives themselves (VACITE, 2016; 2018; ZAFAR et al., 2019; MUSMANNO et al., 2021; VACITE et al., 2023; DE LUNA et al., 2021; CLER & VARRICCHIO, 2023).

The purpose of serving the user population through primary health care was fulfilled, with a view inserted to the principles of homeopathic philosophy, bioethics and principialist ethics ("*primo mal nun facere*" – HIPÓCRATES In BEAUCHAMP & CHILDRESS, 2002). This facilitated matrix support and citizen approximation and integration during the joint planning of the garden, represented a unique opportunity for everyone involved (LEAL et al., 2022). Aspects about intercultural education such as awareness of Environmental Ethics were communicated (FREIRE SOUZA SILVA et al., 2023; CRUZ FILHO et al., 2023).

Ethno-knowledge was valued through awareness of environmental ethics through ethno-centered education, without compromising professional medical ethics performed based upon bioethical clinic (BELLIZZI et al., 2022, b; 2023; HANSEL – MARTINS et al., 2023; 2024), besides academic and didactic-cultural communications: pomegranate, açai, beans, among adaptogens (PANOSSIAN et al., 1999) and other functional foods – papaya, grape, coconut (VARRICCHIO et al., 2019; MUSMANNO et al., 2019; WASIM et al., 2020; ALMEIDA et al., 2022; BELLIZZI et al., 2022).

Health education to balance nutritional status of the host aimed metabolic stimulation, to evoke immunomodulation responses (BELLIZZI et al., 2023). After registering the hybrid education process via hidden curriculum for the Leagues and Medical Residency students at UNIFASE-FMP (MUSMANNO et al., 2023), the intercultural garden III Benoit Mure was then presented under several different aspects, recently tought as an open-air library (HANSEL-MARTINS et al., 2024; GASPAR et al., 2024).

The cumulative effects of different carcinogens or carcinogens are responsible for the initiation, promotion, progression and inhibition of the tumor (INCA, 2018). According to the World Health Organization (WHO), the unrestrained growth of malignant cells results from the interaction between a person's genetic factors and three categories of external agents, which include physical carcinogens such as ultraviolet and ionizing radiation; chemical carcinogens, such as the components of tobacco smoke, aflatoxin (food contaminant, e.g. peanuts) and arsenic (drinking water contaminant); and still

biological carcinogens, such as infections with certain viruses and bacteria and chronic infestations with parasites (WHO, 2013). According to the WHO, it is estimated that in addition to the high prevalence, the incidence of new cancer diagnoses will increase by up to 70% in the coming decades. 35% of cancers are related to modifiable risk factors to which the population is exposed, representing a problem with a high impact on public health (RIVERA-MEZA et al., 2018).

Childhood cancer accounts for 2 to 3% of all malignant neoplasms in most populations. Both in Brazil and in developed countries, cancer already represents the leading cause of death from disease among children and adolescents aged 1 to 19, in all regions of the country (CURVO et al., 2013). Leukemia is the most common type in this age group, representing between 25% and 35% of all types, with Acute Lymphoid Leukemia (ALL) being the most common in the world. Tumors of the Central Nervous System (CNS) represent around 8% to 15% of pediatric neoplasms worldwide and solid tumors are the most common (VIDOTTO et al., 2017).

According to current evidence, between 30% and 50% of cancer deaths could be prevented by modifying or avoiding key risk factors, including avoiding tobacco products, reducing alcohol consumption, maintaining a healthy body weight, exercising physical exercises regularly and address risk factors related to the development of cancer (WHO, 2023).

Noteworthy, the odor and flavor of lemon is provided by the terpenoid limonene, which enhances anti-inflammatory and immunomodulatory actions (BOIK, 2001). Ascorbic acid is found in citrus foods such as lemon, capable of producing proteins such as collagen and has antioxidant properties (SANTOS et al, 2021), anti-inflammatory effects and increases the action of the immune system, therefore, its consumption can be favorable in the prevention and treatment of cancer (ABIRI & VAFA, 2021).

Another phenolic compound found in several natural sources, such as plants, fruits and vegetables, is gallic acid, with antioxidant, anti-inflammatory and antitumor activity and cardiovascular protection (SALAS et al., 2013). Gallic acid present in E. tirucalli from IPPN/UFRJ (VARRICCHIO et al., 2019) may explain the death of tumor cells by apoptosis (TANG & CHEUNG, 2019 In SOUSA DA SILVA et al., 2022).

Beans, in addition to being consumed throughout the country, contain many nutrients, including antioxidant compounds, with Caupi beans being very rich in phenolic compounds, essential for health (FREITAS et al. 2019). It is a food of great socioeconomic importance and one of the most important food sources for society in many regions of the world (BEZERRA, 2015).

Beans involve an enormous abundance of bioactive compounds such as flavonoids, pro-anthocyanidins, anthocyanins, isoflavones, and also some phenolic acids (CHOUNG et al., 2003). There are approximately five thousand phenols, including flavonoids, phenolic acids, simple phenolics, coumarins, condensed tannins, lignins and tocopherols. They are responsible for the color, astringency,

aroma and oxidative stability of foods (ANGELO; JORGE, 2007; NACZK; SHAHID, 2004). Bean phenolic compounds are located in the seed coat, confer antioxidant properties, reduce the amount of pro-oxidant agents and the action of free radicals, preventing oxidative modifications (BOATENG et al., 2008; MARATHE et al., 2011) . In cowpea, 5 classes of anthocyanins were observed: delphinidin 3-glucoside, cyanidin 3-glucoside, petunidin 3-glucoside, peonidin 3-glucoside and malvidin 3-glucoside. Anthocyanins protect leaves from ultraviolet radiation, in certain types of plants they help fight pathogens and improve and regulate photosynthesis (BEZERRA, 2015).

The anticancer effects of grain legumes may be associated with antioxidant activities. Cowpea seeds are a good source of antioxidant compounds considered anticancer (THUMBRAIN et al., 2020). Cowpea is rich in phenolic compounds with potential protective properties on the risk of developing cancer, such as antiproliferative action and cell death induction properties (TEIXEIRA-GUEDES et al., 2019).

Reactive oxygen species are involved in several stages of tumor transformation and progression, such as self-sufficiency in growth signals, insensitivity to anti-proliferative signals, apoptosis, angiogenesis, metastasis, metabolism and inflammation (SILVA & JASIULIONIS, 2014). Protect cells from damage caused by free radicals; these capture, stabilize or deactivate reactive oxygen species (ROS) before reaching the cells (BECERRIL-SÁNCHE et al, 2021) due to the presence of reducing polyphenols and their metabolites in plasma, as well as their effect on the absorption of pro-oxidative components of food, such as iron (CIPOLLETTI et al., 2018). So, foods rich in iron and vitamins are guided and investigated by us (ALMEIDA et al., 2022).

Gutiérrez-Uribe et al (2011 In SOUSA DA SILVA et al., 2022) evaluated the inhibitory effects of phenolic extracts using human breast cancer cells (hormone-dependent MCF-7), showing an inhibition of the growth of hormone-dependent human breast cancer cells of hormones (MCF-7) by phenolic compounds from cowpea. Siddhuraju and Becker (2007) reported a good scavenging activity of cowpea seed extracts on the hydroxyl radical, in addition to greater scavenging activity of these radicals. Therefore, the antioxidant activity of phenolic compounds is attributed to their ability to eliminate free radicals by donating hydrogen atoms, electrons or metal cations; This ability to interact with free radicals is due to its structure, particularly due to the number and positions of the hydroxyl groups and the nature of the substitutions in the aromatic rings (BECERRIL-SÁNCHE et al, 2021).

Garden and functional food nutritional experiences of Benoit Mure Nucleus at Homeopathy Service were submitted to the rigor of health service evaluation by managers, as recommended by Donabedian (PROVE & LIPAT & LAFFH, 2021; MUSMANNO et al., 2022, a; LIPAT/SAPB Project & Institutions, 2022-1) and, once again, was submitted to peer view (WASIM et al., 2022; VARRICCHIO et al., 2022; WENDLING DA SILVA et al., 2023; BELLIZZI et al., 2022, a; 2023). At the current context of great climate instability and uncertainty, consistent rational methodological

investigations are encouraged to be communicated, for evaluation and reflection by scientific community (GASPAR et al ., 2023a; MACHADO, C. V. da S. M./Duigó-TUKANOЊ et al., 2023a).

Furthermore, as a result of pandemic SARS-Cov-2 – Covid19 professional contribution, a *strictu sensu* qualitative ethnographic research has been officially developed regarding the repercussions of social isolation on these ethnic and indigenous leaders in an urban situation in Rio de Janeiro/Brazil by the Psychosocial Care Program of the Institute of Psychiatry of the University of Rio de Janeiro. Brazil – MEPPSO - IPUB/UFRJ. This entire route of bioethical returns and professional experience to families from traditional, ethnic and indigenous originary people, was made through partnership among a school multidisciplinary league LAFFH/UNIFASE-FMP, by discipline at INPI, by the SAPB-LIPAT/UFRJ Project, Homeopathy Service and by the PROVE-IPUB/UFRJ Laboratory. All procedures were included in the documentation submitted to Brazil Platform approved by the CEP/CONEP System/National Health Council (BR/MS/CNS), in Brasília/DF (VARRICCHIO, 2022) and were already communicated (VARRICCHIO, 2022a MACHADO/Duigó-TUKANO et al., 2024; LOPES et al., 2024).

Authors are aware that what they have published is not directly related to Homeopathic Medicine in its prescriptive way. But actions were based upon the philosophical principles of the Organon of the Art of Healing by Samuel Hahnemann (1831, In PUSTIGLIONE & CARILLO JR., 1994), when he referred to professional intelligence contained in hygienic measures removing noxia. Here, it was carried out through health education, in a dialogue with what had been already recommended by the Ottawa Charter, about health promotion at society (WHO, 1986).

Education for sustainability promoted biodiversity, just an ethnocentric education promoted cultural diversity. With this memory recorded, we moved on to discuss other stages of construction in environmental ethics, based on paragraph 9 of Samuel Hahnemann, cooperating that individuals and their families to reach the highest goals of their existence even at certain (some critical) periods of their existence (VARRICCHIO et al., 2023). Vitalism is so generous that always function, always work at Cartesian model, the beginning of research, going into complexity models (GASPAR et al., 2023).

That's our understanding upon Law of Similarity, which can be presented to students (also undergraduates), based on experiments during the short contacts possible, as Scientific Weeks, Congress, etc. Mainly: through correct and pertinent controls used, it was allowed relevant discussion distinguishing the HUD effect from those one of solvent controls effects, nanoeffects, hormetic effects and even the effects of quantum fields generated by luminous fluences, such as the incidence of sunlight during assisted cultives. So, it also emphasized the distinction from the effects triggered by the classical Hahnemannian method of HUD. Plant cell wall and cellular membrane receptors are able to answer to infinitesimales also named HUD solutions (VARRICCHIO et al., 2006; GASPAR et al., 2023, a).

Very relevant, the controls bring the strength of the evidence of statistical results to the fore, observing the effect of HUD on a given biological system under investigation, chosen rationally and carefully, contributing to effective learning and respect for everything that science can still do not explain, but it can move towards this understanding. The methodological commitment positively impacts people's perception, mainly due to the fact that it was adapted to the current model. Most professionals in general still think that this is not possible in any way, because they didn't have access to these type of research during undergraduation period.

University centers are not in the field of doxia. Scientific thinking evolves through complexity, innovation and perplexity. Institutions that host research, support ethical and rational methodological approach to novel research themes. The rational attitude is to investigate carefully (GASPAR et al., 2024).

Therefore, it is urgently to be emphasized that there is still much to be studied in epistemology, the philosophy of science, and in terms of the rigor of the scientific methodology to be adopted, to visit the various consistent studies that exist, in Brazil and abroad, officially published. That's why this group only worked HUD on basic research, this way aiming to environmental rebalancing. Indeed, defining conceptual environmental criteria were respected (GASPAR et al., 2024). It is recommended to study Marcos Zulian Teixeira - PhD (2018; 2020), especially that which deals with epistemology (TEIXEIRA, 2023).

The key points of the chapter stand out:

- This chapter addressed the evolutionary history of the planning and implementation of the intercultural and interethnic garden as a health space, but also as the correct beginning of basic research on plant extracts and ultra-diluted solutions sucussioned by the Hahnemannian method of multiple flasks. Scientific initiations were carried out and are in progress.
- Addressed the characterization, general aspects and socioeconomic importance of an intercultural garden, focusing on Cowpea bean (*Vigna unguiculata* (L.) Walp.) as well as consumption.
- The relevance and nutritional properties of Cowpeas were addressed, as well as the compounds present.
- Some mechanisms of action of phenolic compounds were explained, such as antioxidant effects promoting the reduction of the risk of developing cancer, suggesting it as a preventive functional food to be methodological investigated.

8 CONCLUSION

This work, which began in 2003 with the Environmental Awareness Guide, matured and was completed with the implementation of the third intercultural garden linked to the Homeopathy Service at the 7th Ward in the courtyard of the Hospital Geral Santa Casa da Misericórdia in Rio de Janeiro/Brazil. It was decided to record the care, teaching and research stages of this primary attention care project for families from originary people (indigenous), ethnic and traditional communities in this territory.

The possible beneficial health effects that the bioactive compounds present in Cowpeas can promote in reducing the risk of developing cancer, a serious public health problem. The choice of this theme is mainly due to the high consumption of this food, mainly in the North and Northeast regions, being a frequent component in the diet of almost entire Brazilian population.

As researchers, we unite in favor of rational methodological investigations and to reaffirm principles and values that build well being in society and to environment. Planet as a whole appeals for help.

To conclude, it was understood that the greatest learning resided in respectful, peaceful and harmonious human coexistence, thus resulting in the expression of a healthy garden in balance between its constituent elements and as a health space whose multiple purposes allowed us to appreciate the fragrant aroma it exudes, inviting birds, bees, butterflies and other living beings to contemplate and learn in nature.

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