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Cannabis self-cultivation and social technology


O autocultivo de *Cannabis* e a tecnologia social

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Abstract

The objective of this study is to analyze *Cannabis* self-cultivation for medicinal purposes in Brazil, evaluating to what extent the practice may fit into the framework of what Renato Dagnino termed a social technology. Based on data collected during fieldwork (semi-structured interviews) carried out in two Brazilian urban centers (São Paulo and Rio de Janeiro) and from a participant in the United States, we identified characteristics of these practices that make them akin to a social technology: adaptation to small-scale production, use of cognitive labor to meet social demands, active participation of producers and users in the practice's development, and lack of differentiation between boss and employee. It is worth noting, however, that the notion of social technology is closely linked to the objective of transforming the productive sector. This may limit the application of this concept to non-commercial production aimed at satisfying direct needs. Moreover, given the risks involved in the production of medicines, the generalization of homemade practices such as self-cultivation may not be advisable. These issues could be remedied by the use of open, democratic and citizen-oriented scientific strategies, involving dialogue with public institutions in the technological and scientific field. **Keywords:** Medical Marijuana; *Cannabis* Self-cultivation; Social Technology.

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Resumo

O objetivo deste trabalho é analisar o autocultivo de *Cannabis* para fins medicinais no Brasil, avaliando em que medida a prática poderia ser enquadrada como uma tecnologia social, na formulação de Renato Dagnino. Com base em dados coletados em trabalho de campo (entrevistas semiestruturadas) em dois centros urbanos no Brasil (São Paulo, Rio de Janeiro) e de uma participante nos Estados Unidos, identificam-se características dessas práticas que as aproximam de uma tecnologia social, como a adaptação a pequena escala, o atendimento a demandas sociais por meio de trabalho cognitivo, a participação ativa de produtores e usuários em seu desenvolvimento, e a ausência de diferenciação entre patrão e empregado. Pondera-se, entretanto, que a noção de tecnologia social está bastante ligada a um objetivo de transformação do setor produtivo, o que talvez limite a aplicação desse conceito em situações de produção não-comercial, para atendimento de necessidades diretas; e que a consideração dos riscos na produção de medicamentos talvez torne pouco aconselhável a generalização de práticas caseiras como a do autocultivo. Propõe-se que essa situação poderia ser remediada com o emprego de estratégias de ciência aberta e cidadã, envolvendo o diálogo com instituições públicas do campo tecnológico e científico.

Palavras-chave: Maconha Medicinal; Autocultivo de *Cannabis*; Tecnologia Social.

Self-cultivation and medicinal use of marijuana in Brazil

In mid-2014, the Brazilian debate over medical marijuana gained strength after several court requests for personal use of cannabidiol (CBD, one of the compounds in *Cannabis*) prompted an intense controversy (Pais..., 2014). CBD has already been recognized as having various potentially therapeutic benefits, such as the control of seizures in refractory epilepsy and the reduction of Parkinson's disease symptoms (Brucki et al., 2015).

Social pressure and the endorsement of a section of the scientific community led to the reclassification of CBD by the National Health Surveillance Agency (ANVISA, 2015a). It thus became a controlled substance, part of the agency's C1 list. As a result, ANVISA started to regulate and selectively allow the legal use of this *Cannabis sativa*-derived compound in Brazil, although restricted to medicinal purposes and individual treatment and bound to proof of medical necessity, in the form of a prescription.¹

Months earlier, the Federal Council of Medicine (CFM, 2014) allowed doctors to prescribe CBD for forms of epilepsy that lacked available treatment. Both decisions were applicable only to CBD - considered less capable of triggering psychoactive changes - and not to the plant as a whole. During this period, patients were forced to import CBD from the United States at costs as high as 10,000 BRL per month (Oliveira, 2016). These high import costs, coupled with discussions about possible therapeutic effects of other compounds in *Cannabis sativa* such as tetrahydrocannabinol (THC), provoked a debate about the use of *in natura* marijuana and its medicinal effects. In this context, some families started to obtain the plant's oil extracts from a small group of growers (Oliveira, 2016); others fought in court to obtain rights of self-cultivation for medicinal purposes (Justiça..., 2016).

Although this article focuses on the aforementioned period - which saw the country's first somewhat intense institutional and social debate on medical *Cannabis* - it is worth noting that the controversy

¹ Per Resolution No. 17 (ANVISA, 2015b), CBD was included in the C1 list, dealing with specially controlled substances. Previously, the compound was not in any ANVISA list whatsoever. It used to be considered prohibited due to being understood as a derivative of *Cannabis sativa*. The plant itself has remained in the Brazilian list of outlawed plants (list E). Therefore, its *in natura* use is still prohibited.

is still active. In 2019, ANVISA started to allow the internal commercialization of products and medicines with *Cannabis* compounds, and yet kept denying requests for self-cultivation (Cannabis..., 2019). A month later, the agency also opted for simplifying the import process (Cruz, 2020).

Regarding the impacts of CBD regulation on public health, we found no records of academic studies providing a systematic assessment of the effects of these import permits in Brazil. We did however find reports from local studies and from the press that point to an increasing judicialization of CBD, as lawsuits prompted the Brazilian National Health System (SUS) to start subsidizing patients' medicinal use of the substance (Gurgel et al., 2019; Oliveira; Ribeiro, 2017). A survey by newspaper *Folha de S. Paulo* showed that São Paulo court orders for funding the compound increased by 1,750% between 2015 and 2019. Moreover, pressures to allow self-cultivation via judicialization were still present, since 2019 44 requests had already been granted (Collucci, 2019b). Besides, some collective experiences in the self-cultivation of marijuana for medicinal purposes managed to obtain legal status via legal action. This is the case of the Brazilian Association for Cannabis Support Esperança (ABRACE), a group of patients in João Pessoa (PB). In 2017, the association won a legal battle and was able to obtain an ANVISA authorization for planting marijuana and producing medicinal oil. Nowadays, it provides CBD for 2,500 people (Collucci, 2019a).

Social technology

The concept of social technology is extremely proficuous for an analysis of *Cannabis* self-cultivation in the contemporary context - which involves an expansion in acceptance of the plant's use (in particular for medicinal purposes), and, simultaneously,

an integration of its production and marketing into the formal commercial circuits of the capitalist economy. This section outlines this concept. Although it is used by several authors and organizations that discuss topics such as development and social transformation, here we employ Renato Dagnino's (2014) specific approach. In order to properly understand this concept, however, we must first briefly describe the broader context of the debate in which it arises, and two notions that directly influence it.

During the twentieth century, criticisms against the notions of development (and underdevelopment) gained considerable strength. With decisive contributions by authors such as Frantz Fanon (1968) - who penned a pioneering analysis of decolonization, colonialism and its effects on subjectivity - post-colonialism emerged as a field of study. Through works by authors such as Arturo Escobar (2008), post-colonialism pointed out the importance of recognizing the specific subject configured by neoliberalism, criticizing it while shedding light on otherness: other ways of life, other subjects, other civilizational paradigms (whether existing or possible). The idea of the Global North as a model to be reproduced was called into question by shock waves hitting several fields, including economics and the study of scientific and technological policy (where Dagnino is located).

This is the background for the development of the two concepts that influence Dagnino's (2014) approach: appropriate technology and solidarity economy.

The notion of appropriate technology (originally "intermediate technology") gains notoriety with the work of Ernst Schumacher, especially in his book *Small Is Beautiful* (1973). One of the central aspects of Schumacher's work is to question the premise that the most advanced technology is always the best option, regardless of context. On the contrary, he maintains that the mere transfer of cutting-edge technologies to the Global South² does not ensure

2 The expressions "Global South" and "Global North" describe differences between the world's regions and populations. Unlike other expressions previously employed in the field of social sciences - such as "first world" vs. "third world," which emphasized the impact of the Cold War on global geopolitics; or "developed" vs. "underdeveloped," which understands development as a supposedly civilizational, universal ideal - they are centered on inequalities of power, the continued effects of colonialism, the resistance offered to these processes, and the actors and knowledge that were invisible to the previous epistemological paradigm. It is also important to note that, in these expressions, countries are not always regarded as homogeneous units: they incorporate the idea of intersectionality, considering that there are populations (such as blacks, immigrants etc., depending on the society in question) within the countries of the "North" that are in fact part of the Global South, since they also suffer from the effects of power asymmetries and colonialism. For an introductory view on the topic, see Data & Connell (2012).

socioeconomic development, and even threatens the planet's sustainability. Appropriate technology seeks adequacy to the context in which it is used. Its main differences in respect to conventional technology are affordability, with less investment per job assignment; small productive scale, with less risk of damaging the environment; and openness to human creativity, "humanizing" labor.

This notion strongly resonates with the critical thought on science and technology produced in the periphery of capitalism - in the case of Latin America, exemplified by works such as Amílcar Herrera's (1971). This is no mere coincidence: a strategy for economic development centered on the transfer of cutting-edge technology, widely defended during the post-war years of the "Glorious Thirty," prompted a worsening of dependence relationships between poor and rich countries. The former now had to purchase extremely expensive technological packages from their prosperous counterparts, yet these packages included no provisions for autonomy in research or even adaptation. In this way, dependent nations remained under very unequal (and subordinate) conditions of global-market insertion. The so-called Green Revolution - an agricultural transformation that took place in regions of the Global South during the 1950s and 1960s - is a good example of this strategy's shortcomings. Focused on mechanization as well as intensive use of agrochemicals and aiming at increasing productivity through large-scale monoculture, it ended up accentuating socioeconomic inequalities within these countries, including an increase in land-ownership concentration (Dunn, 1978, p. 67-69). This worsened the South's dependency on the Global North, in large part due to the centrality, in the Green Revolution, of petrol-derived inputs and patented industrial equipment.

Strongly influenced by the cooperative movement, solidarity economy, on the other hand, proposed a gradual reorganization of the productive system, aiming to ensure equal rights between citizens. The two main tenets of this novel mode of production - whose main theoretician and political supporter in Brazil was the economist Paul Singer (2002) - are self-management and the collective possession of the means of production. The first would democratize

the production process, placing fundamental decisions in the hands of workers (not investors, shareholders or bureaucratic managers), and the second would allow for a less unequal distribution of productive gains.

In Dagnino's (2014) formulation, social technology combines both notions: on the one hand, it values technologies that are appropriate in the context of the Global South; on the other, it strives not only for technological adequacy, but also for the effective transformation of productive relations (even in the local context), leading to a less unequal and less hierarchical society, as advocated by solidarity economy. It is worth noting that Dagnino insists that the notion of appropriate technology has glaring insufficiencies: although it problematizes socio-environmental unsustainability and the subordination associated with the transfer of conventional technology, its scope does not include a more radical social transformation project. This absence is evident both in the cognitive sphere - where it lacks a more critical view regarding the supposed neutrality of technology - and in the socioeconomic sphere, where it does not allow for a path towards the transformation of productive relations to be envisioned. In any case, it does fill a gap in solidarity-economical thought, which had not specifically addressed the role of technoscience.

Dagnino's works (2014, p. 23-24, 211-212, our translation) point out the following aspects as major characteristics of social technology:

1. "adapted to a smaller physical and financial size";
2. "non-discriminatory" and "freed from the differentiation ... between boss and employee";
3. "oriented towards a mass internal market";
4. "liberating for the potentiality and creativity of the direct producer," and "from the get-go, it is developed with the active participation of those who need it and will use it";
5. "oriented towards generating work and income through production";
6. "its focus lies on the social and economic segments that make up the so-called 'informal economy,' potential members of the Solidarity Economy";

7. “can be autonomously reproduced and applied”;
8. “incorporates the dimensions of economic, social, cultural and environmental sustainability and the growing drive of social participation, using creativity, originality, autonomy and sovereignty”;
9. “demands the understanding of Technoscience as a social and political construction and the rejection of the myths of scientific Neutrality and Determinism.”³

As evidenced in this list of characteristics, the author defines social technology in contrast to the “conventional technology” that is valued above all other forms of technology in the capitalist system; he argues that the latter is quite adequate to maximize large companies’ profit margins, but not to promote social inclusion. Conventional technology typically seeks to increase productivity by decreasing labor requirements while paying little attention to other variables that also affect it. This leads to mass unemployment and the widening of socioeconomic inequality, besides requiring ever increasing production scales in order to remain optimal (that is, each technological advance tends to demand a larger scale of production and, consequently, a larger capital investment), coupled with intensive use of synthetic inputs (which leads to environmental degradation and dependence on large suppliers), and focusing primarily on the most profitable markets, rather than the needs of local communities. As we will see, this counterpoint between social and conventional technology is also relevant in the case of medicinally oriented *Cannabis* production.

Although the solidarity-economy field has already discussed the challenges and contradictions of employing conventional technology in its ventures, Dagnino (2014, p. 23, 13, our translation) approaches

this difficulty directly. For him, social technology can potentially overcome such contradictions, since it would be “capable of making self-managed enterprises economically viable.” Therefore, social technology should “be treated as a cognitive platform for launching the Solidarity Economy proposal.”

Self-cultivation and social technology

This section discusses the relationship between the notion of social technology as insofar presented and the issue of *Cannabis* self-cultivation. To this end, we will now examine part of the data this study obtained during field research; more specifically, a total of seven interviews⁴ with: the organizer of a clandestine network which donated self-cultivated *Cannabis* oil extracts to patients who used it for medicinal purposes (José Martins); two people undertaking preparations to migrate to self-cultivation (Cidinha Carvalho and Margarete Brito);⁵ two people who made use of industrially produced CBD (Katiele Fischer and Penny Howard); and two lawyers who provided legal assistance to cultivators (Fernando Silva and Emílio Figueiredo).

Firstly, we emphasize data indicating that the technology used for oil cultivation and extraction is suitable for small-scale production, as it has modest capital investment requirements – contrary to what tends to occur in industrial production, and in line with what is expected of social technologies (per Dagnino’s aspect 1).

In 2016, the clandestine network supplied 11 patients; meanwhile, Cidinha and Margarete were migrating to self-cultivation, seeking to treat their daughters’ refractory epilepsy.

In one of the interviews, an organizer of the clandestine network told us that they took a course with an anonymous doctor from California (USA) who knew the ins and outs of Cannabis production.

³ Although they appear in two different texts by Dagnino (2014), we have grouped and numbered these characteristics to simplify the allusion to them in the rest of the article, naming them “aspect 1, aspect 2 etc. of social technology.” Aspects 1-3 are extracted from pages 23 and 24; 5-9 are presented between pages 211 and 212 of Dagnino’s book; and aspect 4 combines elements from the two excerpts.

⁴ Interviews originally conducted for a doctoral research paper (Oliveira, 2016) where they are more thoroughly analyzed. These were carried out with participants from large Brazilian urban centers (São Paulo and Rio de Janeiro). One participant was from the United States. They were men and women over 30 years old.

⁵ At the time, the interviewees were recipient of oil extract supplied by the clandestine network; however, they were already in the process of migrating to self-cultivation. After the interview, they successfully obtained cultivation rights in court (Karam, 2018).

This was later corroborated by a lawyer who was acquainted with the growers (Fernando Silva, interviewed in 2016). Adequate equipment was purchased and cultivars rich in CBD were imported.

Our people were already cultivators. We used it to relax, to be together. After becoming aware of the mothers' situation from a news report and having a good grasp of the costs involved, we had this idea. At the time, a small cannabidiol tube would set you back 500, 600 dollars. But we started to realize that the plant was big and [cultivating it] was free. It was so unfair. These parents were basically buying broccoli juice at gold prices. We thought: let's select some plants, separate one that is rich in CBD, and use our experience in cultivation... and that was it. We made a commitment to give it [the oil extract] to the people who needed it. We were fully aware that providing the oil to a dying aunt with cancer was different from giving it to children. So we started researching. We looked for doctors and began to follow best practices. (José Martins)

They are well-studied and well-grounded people, even legally speaking. But they do it in hiding because they know that the current understanding is that their activity may be regarded as drug trafficking. They do it with great care, but also with strong foundations. I imagine that they are very well prepared for possible legal issues, with lots of documentation, lots of evidence to show that their proposal is to fight for the health of people in need. (Fernando Silva)

The cost of production was low, so this opened the possibility of self-cultivation by people with median incomes:

The startup cost of an already existing crop starts at only 5 BRL: the price of the bottle used to distribute the oil. There is also the cost of shipping, which will depend on the region. Extra virgin avocado oil is used to dilute the Cannabis extract. The cost of avocado oil is 20 BRL per liter. The electricity bill for the entire crop is around 200 BRL. (José Martins)

Martins also reports that the clandestine production chain initially distributed the oil via mail, free of charge; however, faced with the possibility of an accusation of

medicine falsification or trafficking in prohibited substances, they ended up limiting the project's scope to encouraging third parties to self-cultivate. The option to promote decentralized self-cultivation was also prompted by an increased demand for the oil extract, which started to bear heavily on the network's limited production capacity, increasing costs.

Our idea was very, very cool, but it was also unsustainable. We have planting limitations and also financial limitations. These people require continuous treatment and even today, after more than two years, we are still providing the product to them, without interruption. Of course we cannot just get up one day and tell a person who has become dependent on the medicine to just "go it alone and plant it." We'll continue donating to some. We used to have a social option for low-income people, who would be unable to obtain the imported goods. Many do not even have the necessary conditions to start planting. My mother, for instance, lives in Vigário Geral, practically in a shack. She is in no condition to cultivate. We had gatherings here at the Instituto Estadual [Fernandes Figueira State Institute, linked to the Fiocruz Foundation] with people looking for imports, but she refused to attend. She would answer: "gee, I'm so ashamed, because even if they allow me to plant it, I don't have the resources to actually do it. All I have is this pension, which is barely enough to feed myself." She's a grandmother, actually, a grandmother who has to take care of her granddaughter. And she used to say: "I have to eat, buy medicine, clothes, living expenses, pay for electricity and telephone bills." And all of that practically amounts to the price of a single CBD ampoule. (José Martins)

It is interesting to note that, although the network ended up being limited by its production capabilities, this was due to the fact that it distributes the oil extract in a non-commercial way, covering its own costs in a virtually philanthropic manner. Although this philanthropic character stands in disagreement with aspects 3 and 5 of Dagnino's definition of social technology, it is fully in line with aspect number 2. Moreover, decentralized technology replication was shown to be feasible, requiring modest capital investments,

making small-scale production viable (in line with aspects 7 and 1).

Cidinha Carvalho was one of the people who was initially given access to the network-distributed oil, but was later advised to migrate into self-cultivation. She even took a training course at a non-governmental organization (NGO) known as Mamá Cultiva, in Chile, which helped Chileans in a similar situation (Mães..., 2016). After undergoing this formative experience, Cidinha filed a legal action in October 2016, and eventually obtained an injunction authorizing her to self-cultivate (Karam, 2018).

Contact with self-cultivation and the possibility of trying other types of oil other than the imported version led many families to question the idea that only industrialized, “isolated” CBD could have a beneficial effect. According to Cidinha, her daughter managed to have more control over her seizures using the artisanally produced oil. Similarly, other families started to experiment with cultivation, many in partnership with their doctors. This was the case of interviewee Margarete Brito, who would also eventually manage to obtain an injunction authorizing her to self-cultivate (Karam, 2018).

I called my doctor, Eduardo Faveret, and talked about what I had discovered on marijuana, and his answer was: “I know, I would probably do the same thing.” In other words, what he was saying to me was something like: “let’s learn together, let’s send this to a lab in order to get it tested, and so on.” He was a genuine partner from the very first moment, open to listening and learning together. I mean, he was really solidary. (Margarete Brito)

These mothers’ experiences led to the creation of two patient associations: the “Associação de Apoio à Pesquisa e Pacientes de Maconha Medicinal” (APEPI) and the “Associação Cultive,” led by Margarete Brito and Cidinha Carvalho. These provide people with assistance in self-cultivation.⁶ Members of APEPI pay a fee of 29.90 to 99.90 BRL in order to

have access to information and product discounts. Likewise, the “Associação Brasileira de Pacientes de Cannabis Medicinal” (Brazilian Association of Medicinal Cannabis Patients – AMA + ME), located in Minas Gerais, provides its members with advice on self-cultivation. It has gone as far as submitting a Direct Action of Unconstitutionality (ADI/5708) alongside the Popular Socialist Party (PPS), in which it argues that the ban on medicinal marijuana self-cultivation is unconstitutional.

Since it is not possible to create financial ventures based on the cultivation of medical *Cannabis*, as the substance is considered illegal in Brazil (Brasil, 2006, p. 11),⁷ these associations end up becoming spaces for promoting the self-managed use of independent technologies for medicinal *Cannabis* cultivation and oil extraction. This is something that the clandestine network was unable to achieve, due to its legal status. In addition to guiding families in matters of self-cultivation, these organizations seek to establish jurisprudence that allows such practices to legally occur, as in the example of the unconstitutionality action filed by one of the patient associations.

Through the circulation of knowledge on production technologies and research in the area, associations are also able to help patients develop a critical assessment of the imported compound, addressing possible idealizations regarding its underlying productive technology (in line with aspect 9 of Dagnino’s definition of social technology). Interviewee Leandro Ramires, who leads the AMA + ME association, is among those expounding this type of questioning: according to him, the imported compound was assigned a drug status even though, in practice, it is not very different from the oil extracted by means of self-cultivation:

Cannabidiol is akin to an extra virgin olive oil. That’s basically it, it’s nothing extraordinary. It’s a food supplement that requires a recommendation, not a prescription. This [distortion] is what creates the entire illegal drug situation. There are people in the

6 Attributions can be checked at: <<https://bit.ly/2MUgWqu>> and <<http://apepi.org/>>. Access on: May 3, 2019.

7 This situation differs circumstantially from aspects 3 and 5 of social technology. However, it is worth noting that, had there been no prohibition, the technology would be in line with both aspects. Furthermore, if our understanding is that the network’s clandestine character is analogous to economic informality, there is also a partial alignment with aspect 6.

USA who pay 10 thousand dollars for a kilo of CBD, and then stick a label to it. Hemp Meds sells people a bucket of the stuff. An average joe purchases it, puts it in a small recipient, sticks a label to it and sends it to Brazil. This is what it has come to. (Leandro Ramires)

Ramires points to a contradiction often mentioned by activists: the reason why CBD is considered a controlled substance in Brazil, even though the main supplier of the imported compound used to treat it as a food supplement (Oliveira, 2016). The contradiction is deepened by the issue of cost. Considering exchange variations and import costs, prices could reach as high as 10,000 BRL per month. These costs started being transferred to the Federal Government and the SUS after several patient lawsuits (Juiz..., 2016). Oliveira (2016) points out some factors that can help explain the apparently dissonant character of the ANVISA decision within this context. These included political pressures to avoid confusing the issue with the marijuana decriminalization or legalization debates, as well as joint yet sometimes antagonistic pressures from families and researchers: the former demanded the immediate importing of the compound, while the latter measured the risks of indiscriminate regulation.

Even among those who used the imported substance, the absence of intake protocols and the lack of available information, which configured the status quo before ANVISA's reclassification of CBD, ended up encouraging autonomous experimentation by people seeking to alleviate serious symptoms. Katiele Bortoli Fischer (interviewed on April 1, 2016), the mother of a patient with refractory epilepsy who made use of imported CBD, followed her daughter's evolution with daily charts and graphs, in which she made an account of her seizures (Oliveira, 2016). Interviewee Penny Howard, who also treated her epileptic daughter, told us that she had to learn that CBD was different from traditional anticonvulsant medications. She did not have to fear an overdose, for instance, and, in that sense, it became clear that CBD increases patients' and family members' conditions for taking charge of treatment.

And since we were administering drugs with overdose risks, I think we were afraid to settle for the simple nutritional supplement, to take charge. And the important thing about the product is

that there was no likelihood of overdose. The only negative thing it can do to you is make you tired. And when people understood that, they became happy with the results and felt comfortable. Parents could take charge and some of them found it didn't work, but that didn't discourage them. They could always try something else, another producer, or a product with higher THC contents. (Penny Howard)

While it is true, on the one hand, that both self-cultivation and using the imported substance allow for users to actively engage with the process, making use of their own technologies - for example, evaluating and adapting management protocols in order to maximize their therapeutic effects - it is also necessary to consider that self-cultivation offers better conditions for choosing the product's characteristics. The choice of specific cultivars, for instance, leads to variations in the final composition, as reported by interviewees from the clandestine network. In this sense, due to the relatively horizontal character of relationships within cultivation networks and associations, self-cultivation is characterized by indifferentiation not only between boss and employee (in line with aspect 2 of Dagnino's definition of social technology), but also between producer and consumer. Thus, Cidinha Carvalho points out how, during her experience in Chile, mothers were able to manufacture and test the product while seeking a combination of cultivars and compositions able to provide the best treatment response in their specific cases (directly in line with aspect 4).

I came to Chile and participated in the mothers' workshop, Mamá Cultiva, run by the Daya foundation. I learned how to make oil there and talked to many mothers. What I realized was that ... the oil that they made there is from flowers, from actual flowers, which contain all the cannabinoids, right? And this is what produces that effect. And the mothers there in Chile, they can keep testing until they find a composition that provides the best treatment response. And in the case of many mothers I talked to, the best answer was ... a 1 to 1 THC ratio. [Or] more THC than CBD. But here THC is trivialized. It's seen as an evil thing,

but it's nothing of the sort. THC is helping my daughter to make actual progress. You don't have to listen only to [José] Crippa, who is synthesizing the plant. You have to listen to all sides, open up to all sorts of possibilities. If you believe the craft product is dangerous, that it is taboo, then test it, give yourself the opportunity to research this. Why don't you do it? It's easier to say these things when you haven't seen the results. So, how about it? Many children don't have a positive response to the imported substance. So, I won't start importing it just to stay within legality. I need my daughter alive. (Cidinha Carvalho)

we consider self-cultivation as an alternative to the acquisition of imported industrial products). This idea appears in the testimony of lawyer Emílio Figueiredo, who provides services to people interested in self-cultivation:

Nobody wants to keep importing it, subjecting themselves to that, and nobody wants to rely on the State in order to get the medicine. Everyone who's understood that medical cannabis can be made at home, in the backyard, what they want is permission to actually make the medicine used by their children or by themselves. (Emílio Figueiredo)

These experiences by Cidinha and other growers, as well as the work of associations that publicize the practice, allow for other possibilities in the production of medicinal compounds (in line with aspect 8 of social technologies, referring to “autonomy and sovereignty,” particularly when

We systematized the previously described field findings in Chart 1, indicating the presence (or partial presence, or absence) of the characteristics of social technology proposed by Dagnino (2014) in the medical marijuana self-cultivation practices addressed here:

Chart 1 – Characteristics of social technology in Cannabis self-cultivation

Characteristics of social technology	Presence in Cannabis self-cultivation
(1) “adapted to smaller size”;	Yes: families and networks manufacture on a small scale, for their own consumption or donation.
(2) “non-discriminatory”; no distinction between “boss and employee.”	Yes: non-commercial production and distribution; horizontality in networks and associations.
(3) “oriented towards a mass internal market”;	Partial: production oriented to internal needs (but with a restricted public, and organized in a non-commercial way).
(4) “liberating for the potentiality and creativity of the direct producer,” “developed with the active participation of those who need it and will use it.”	Yes: final consumers (who may even be the producers themselves) are involved and engaged in improving and adapting the technology.
(5) “oriented towards generating work and income through production.”	No: production organized in a non-commercial way.
(6) “its focus lies on the social and economic segments that make up the so-called ‘informal economy,’ potential members of the Solidarity Economy.”	Partial: clandestine character analogous to informal economy; general affinity with specific characteristics of solidarity economy (self-management, collective ownership).
(7) “it can be autonomously reproduced and applied.”	Yes: networks and associations encourage replication.
(8) “economic, social, cultural and environmental sustainability ... social participation, ... autonomy and sovereignty.”	Partial: valorization of autonomy and sovereignty (substitution of industrial imports); insufficient elements to assess sustainability (environmental, cultural etc.)
(9) “demands the understanding of Technoscience as a social and political construction and the rejection of the myths of scientific Neutrality and Determinism.”	Partial: there is a (somewhat undeveloped) criticism of the idealization of cutting edge-industrial technology, together with its alleged neutral character and its suitability to the Brazilian context.

Social technology, new epistemologies and citizen science

Before proceeding to our conclusions, this section makes brief considerations about the relationship between the notion of social technology and the so-called epistemologies of the South.

The social technology model proposed by Dagnino (2014) has several points of contact with research on the South's new epistemologies. This body of work proposes the legitimacy of historically unrecognized forms of knowledge, linked to practices of resistance and struggles against oppression (Santos, 2019). As we have seen, for a practice to be considered a form of social technology, among other criteria, it must incorporate "social participation, using creativity, originality, autonomy and sovereignty" (Dagnino, 2014, p. 212). However, although a practice that relies on the exercise of autonomy by its agents potentially opens a path for alternative forms of knowledge and ways of life to be made visible and to be duly considered, integrating this knowledge into the global capitalist mode of production - without deforming it - is certainly a challenge.

Among aspects of this challenge, Boaventura Santos (2019) points to questions of authorship: many forms of knowledge are engendered by collective, not personalized subjects. In capitalist production, on the contrary, authorship is regarded as an individual attribute, linked to the instrument of intellectual property. This allows the transformation of such knowledge into commodities largely controlled by corporations. This is one of the reasons why social justice would be impossible without cognitive justice, as Santos argues.

Another dimension of this challenge is the need to rethink the universalist model of science, which assumes that the legitimacy of knowledge can only be evaluated by means of excluding categories. This model's outcome is that only knowledge produced strictly within the scientific field can be considered legitimate. The case analyzed in this paper points to the potential of incorporating actors that initially appear as external to this field as an important step in the building of scientific knowledge. Discussions on citizen science or open science have a similar

vein, suggesting that this incorporation, done in a judicious manner, may not only be favorable to the quality and effectiveness of the scientific process, but also work towards the democratization of scientific agenda, bringing it closer to broader social interests (and not just those of large corporations). Furthermore, there is also a clear need to reevaluate some of the assumptions of this universalist model, such as the separation between ethics and politics, science and values, nature and culture (Lacey, 2009; Latour, 1994; Santos, 2019).

Finally, the epistemologies of the South allow us to understand that the categories of knowledge are permeated by assumptions of ethnic-cultural inferiority and by the legacy of colonization. In this sense, it becomes clear that there is a coloniality in knowledge itself, just as there is a coloniality in our dominant relations of production. At the same time, relations of production in the Global South have been directly permeated by another colonial category: race, which historically differentiated wage earners from non-wage earners (Quijano, 2005). Since liberal economic practices incompatible with the definition of social technology have parallels with modern scientific categories - in their "ahistorical," transcendent, universal and metaphysical character - it follows that transformations in the productive sphere are heavily dependent on cognitive transformations (Dávalos, 2011).

Final considerations

Our analysis suggests a significant affinity between practices of medicinal *Cannabis* self cultivation and the characteristics of social technology as formulated by Dagnino (2014). We believe that, even in their localized context, such practices are favorable to socioeconomic development. This is evidenced by the achievement of improved living conditions for patients who make use of these drugs, and by the expansion of the involved actors' productive capabilities. For these very reasons, such practices favor the transformation of social relations towards a less unequal and hierarchical reality. In that respect, it is crucial to emphasize the contrast between self cultivation practices and the acquisition of CBD as an imported industrial medicine. The latter creates a situation in

which access to the drug becomes profoundly unequal, limited to those who can afford its high costs. On a broader socioeconomic level, this situation mirrors Brazil's subordinate insertion in the global market (vis-à-vis countries of the Global North, exporters of industrialized CBD). Understanding *Cannabis* self-cultivation from the perspective of social technology also allows for important contributions towards the debate on its medicinal use, besides being conducive to technological autonomy and socio-environmental sustainability. These problems are rarely considered from the perspective of conventional technology, while social technology, on the contrary, may offer solutions bound to small-scale, local forms of production.

Two considerations, however, must still be made: one regarding possible limitations of the notion of social technology, and another regarding the risks involved in adopting such a strategy in the production of medicines, as well as the potential for citizen science approaches to mitigate these risks.

The first consideration is that our analysis points to a possible limitation of the notion of social technology. The characteristics of social technology that do not manifest themselves in the analyzed practices (3 and 5) are those linked to market-oriented production (even if this production takes place within a solidarity framework) and, consequently, to the generation of income. Here, a distancing from social technology occurs, since self-cultivation is performed as a non-commercial form production. This may not be a coincidence, as Dagnino (2014) sees the effective transformation of the **productive sector** as a central goal of social technology. However, is it necessarily true that non-commercial production aimed at directly satisfying the needs of producers (or the needs of patients benefited by them, in the case of the analyzed network) has a lesser transformative potential than commercial production, as Dagnino's perspective seems to imply? In the context of this case, the answer to this question is in no way evident, and arriving at a definite conclusion would require a more detailed comparison. This apparent limitation suggests that the notion of social technology does not fully contemplate the transformative potential of practices whose main objective is not **economic** development, but rather meeting people's direct needs in an autonomous or communal way, for instance.

Our understanding is that the analysis of self-cultivation presented here may contribute additional criteria to the definition of social technology proposed by Dagnino (2014), to a certain extent overcoming these limitations while preserving the concept's inner strength: the idea that technologies appropriate to the Global South are a means of transforming the current relations of production. In this sense, our proposal is that characteristic number 3, which describes social technology as "oriented towards a mass internal market" (Dagnino, 2014, p. 23, our translation), could be supplemented by the sentence "or changes in collective patterns of consumption." Furthermore, characteristic number 5, which describes social technology as "oriented towards generating work and income through production" (Dagnino, 2014, p. 211), could be supplemented by "or towards meeting the direct needs of individuals and communities." These two proposals are based on the understanding that Marxist analyses sometimes underestimate the relevance, in capitalism, of practices related to the reproduction of life (such as domestic work, but also health) (Federici, 2017), possibly because they are regarded as non-productive work from the perspective of capital, in Marxian terminology. Our perspective, on the other hand, is that practices that are adapted to the economy of Global South and give rise to collective changes can contribute to transforming the relations of production, even when they are not aimed at generating income, but rather at meeting direct needs (including those related to health) that would otherwise be supplied by the capitalist market. This statement would be valid at the individual level (since these self-cultivation practices may be individual, but are also replicable), and even more so at the community level (with the formation of non-commercial self-cultivation networks).

As to characteristic number 2, which describes social technology as non-discriminatory, we believe that it is important to explicitly include gender and ethnic-racial equality as a goal. This would imply discussing the active integration of women, blacks and minorities into socio-technological production, with an equitable division of jobs, working hours and income (if any). The active participation of women is a notable aspect of the activism and defense of *Cannabis* self-cultivation. While the central actors

in this defense belonged to the white urban middle class (Oliveira, 2016), the majority of the victims of the drug war are members of the black, peripheral population. Our understanding is that both gender and race categories contribute to the reproduction of inequalities by establishing differentiations between paid work, poorly (or unpaid) work, and even work that is forced into illegality, thus reproducing cycles of poverty and criminalization in less favored regions (Federici, 2017; Quijano, 2005).

In addition to these considerations and proposals, however, this article calls attention to the specificity of the health area and its relationship with the productive character of social technology. In regards to this aspect, we believe that forms of craft production such as self-cultivation - except in specific situations where there are gaps in medicine production or diseases in which the severity of the condition makes risks acceptable - would not be a desirable horizon for the health area as a whole, considering the dangers associated with possible variations in product quality. The practices described here were developed in the absence of specific legislation. The very regulation of CBD and the permissions granted to self-cultivators occurred due to the severity of the conditions under treatment and because effective use could only be conceived by means of expanded access. Analogous situations occur when medications that are still in clinical development are released under conditions of compassionate use:

Compassionate use: release of a promising new medication that is still not registered with ANVISA - and which is in the process of clinical development - for the personal use of patients who are not participating in expanded access programs or clinical research; aimed at patients with severe debilitating diseases and/or life threatening diseases who have no satisfactory alternative in any products registered in the country. (CFM, 2014)

In view of this caveat, however, we believe there is legitimacy to a form of production in which, having previously analyzed the potential risks of such an undertaking, citizens could be guided and supported by renowned public research centers - offering training, testing and results evaluation - in order to limit the risks of using homemade CBD oil extract. This is the point of entrance to a debate involving categories such as citizen science, in which scientists and members of the public work together in both the collection and interpretation of data (Halavais, 2013). This perspective is able to contemplate the specific trajectories, for instance, of citizens who are carriers of chronic diseases, and end up having significant contact with scientific production and knowledge simply by virtue of their condition.

We understand that this last proposal configures a great challenge, considering, among other factors, the prevalence of the biomedical model and the fact that scientific medicine predominantly produces evidence in a 'purified' and decontextualized manner. These models have little space for forms of production that are autonomous or seek a collaboration with the scientific field. Furthermore, through their representative institutions, they deepen the separation between medicine and lay knowledge; in the case of CBD and self-cultivation, this strict separation was shown to be neither adequate nor sufficient for the necessary contextual responses. The controversy presented here is illustrative of this dispute: one of the main arguments raised against self-cultivation is the desire for production to follow strict standardization parameters - and these parameters, nowadays, would only be achievable in industrial production.⁸ Our proposal aims to build a space of conciliation between these different forms of knowledge and practices, insofar as it seeks to conceive the necessary standardizations in a way that allows for their expansion beyond a singular mode of production (the industrial), penetrating social technologies such as self-cultivation. The

8 This observation is based on ANVISA's parameters for the approval of medicines, in which only a duly formalized company can apply for registration. Extensive documentation must be submitted, containing all necessary tests, according to information from ANVISA (Registro..., 2018). The case of CBD, however, was atypical, and the regulatory process was construed on the basis of research from ANVISA's own technical expertise sector, besides consultations with research institutions, doctors and patients (Oliveira, 2016).

decentralized structure of social technology also confers visibility (and increased openness) to other epistemologies and “lay rationalities,” contributing to the production of innovative responses more appropriate to different social and cultural contexts (Alves, 2015). This subject, however, is extensive and deserves a more in-depth discussion in future studies.

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