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Coca and Its Medical Applications:
Prospects, Obstacles and Lessons Learned

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OBSERVATORIO COLOMBIANO DE CRIMEN ORGANIZADO

Universidad del Rosario | Facultad de Estudios Internacionales, Políticos y Urbanos

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EL OBSERVATORIO COLOMBIANO DE CRIMEN ORGANIZADO (OCCO)

El crimen organizado (CO) constituye una de las mayores amenazas a la seguridad en América Latina. Éste ha generado una gran afectación en cuanto a la violencia, la corrupción y el debilitamiento institucional, razón por la cual existe una necesidad urgente de comprender la penetración del CO en el tejido de las sociedades contemporáneas en todo el continente.

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ABSTRACT

What possibilities exist for the industrialisation of the coca leaf? In this report, we review the creation of regulated markets for products derived from opium and cannabis, and discuss the lessons learned. While most coca-based products are currently alimentary - including teas and soft drinks - this report takes a step further and, based on the latest scientific research, analyses the potential medical applications of the coca leaf. The preliminary research, which still needs to be expanded significantly, appears promising. However, unlike cannabis and opium, coca does not rely on a large base of pre-existing users; the incentives for businesses are therefore less prominent than in the other cases.

The report highlights the prominent role the state can play in encouraging research and product development. In Colombia, the market for coca-based products is less developed than in Peru and Bolivia, and the products that are produced fall into a legal grey area. The creation of a regulated market and the industrialisation of the coca leaf would not be an answer to the problem of illicit drug cultivation in Colombia. Nonetheless, it could allow for a new agricultural product to enter the market, with the potential for the creation of value-added goods with medical applications. Before this can occur, however, a number of legal and political obstacles in Colombia need to be overcome.

RESUMEN

¿Qué posibilidades existen para la industrialización de la hoja de coca? En este informe revisamos la creación de mercados regulados para productos derivados del opio y el cannabis, y discutimos las lecciones aprendidas. Si bien la mayoría de los productos a base de coca son actualmente alimentarios, incluidos tés y bebidas, este informe da un paso más y, basado en las investigaciones científicas más actualizadas, analiza las posibles aplicaciones médicas de la hoja de coca. La investigación preliminar, que aún debe ampliarse significativamente, parece prometedora. Sin embargo, a diferencia del cannabis y el opio, la coca no depende de una gran base de consumidores preexistentes; los incentivos para las empresas son, por tanto, menos importantes que en los demás casos.

El informe destaca el papel importante que puede desempeñar el estado en el fomento de la investigación y el desarrollo de productos. En Colombia, el mercado de productos a base de coca está menos desarrollado que en Perú y Bolivia, y los productos que se producen caen en una zona gris legal. Si bien la creación de un mercado regulado y la industrialización de la hoja de coca no serían una respuesta al problema del cultivo de drogas ilícitas en Colombia, podría permitir la entrada al mercado de un nuevo producto agrícola, con potencial para la creación de bienes de valor agregado con aplicaciones médicas. Sin embargo, antes de que esto pueda hacerse en Colombia, es necesario superar una serie de obstáculos legales y políticos.

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Coca, development, industrialisation, counter-narcotics, legalisation

Coca and Its Medical Applications: Prospects, Obstacles and Lessons Learned

Introduction

The industrialisation of the coca plant is still in its embryonic stages. In Bolivia and Peru the state has embraced the opportunity to allow for the creation of derivative products, and coca is used in tea, toothpastes, soft drinks, gels, bread and other alimentary products. In Colombia, however, such initiatives are sparse and restricted to individual licenses lacking formal regulatory recognition.

Increasing the availability of such products, based on the Bolivian or Peruvian models, would be a positive step, but the evidence suggests that the market for the present range of products is relatively limited. In this report we therefore aim to look further ahead than nutritional and agricultural uses. We will consider the lessons learned from the experiences of medical opium and cannabis, and the creation of regulated markets. And, based on the latest research, we explore the potential medical - or 'phyto-therapeutic' - applications of the coca plant.

Coca: Outlier or Laggard?

Both opium and cannabis have established themselves in the medical field. Cannabis is prescribed by doctors as a means to alleviate pain and anxiety, and derivative products, such as CBD oil, can now be purchased legally in many countries. Under tightly controlled conditions, opium poppies are grown legally in a limited number of countries to supply the medical opiate market. Yet, beyond the limited use of cocaine in some medical settings, coca lags behind.

The coca plant and the opium poppy share many similarities. For millennia they have been used for medicinal, recreational, and ceremonial purposes. They have become entwined with politics. For example, when the Spanish conquistadors, aware of the appetite-suppressing and productivity-enhancing properties of the coca leaf, at first repressed and later, wherever the labour-intensive economy demanded it, encouraged its use among the indigenous population who worked as effective slaves in the New World. Or in 19th century Asia, when the British East India Company began smuggling opium from India into China, leading to a series of deadly wars. The famous derivatives of opium and coca, namely heroin and cocaine, were first isolated in the mid 19th century. Like opium, coca requires chemical processing to

transform its endogenous alkaloid content (cocaine) into cocaine hydrochloride (the white powder) and other derivatives. Yet the coca leaf and the opium poppy have had entirely separate fates. Opium has been considered a panacea for medical ailments for around eight thousand years. It has been used recreationally by prominent, romantic figures in Western culture. And today it is impossible to imagine modern medicine without the anaesthetic properties of morphine. Illegal heroin, rather than the natural product of the opium poppy, is largely perceived to be the result of the manipulation of the plant for illicit purposes. Despite its equally longstanding cultural heritage in South America, coca, meanwhile, has been largely forgotten outside its original homeland: it has become synonymous only with cocaine, the more harmful 'crack', and all of their damaging connotations, including addiction, violence and widespread corruption. So ingrained is this connection that, in the international and local press, it is possible to read of the nonsense term "cocaine cultivation."[1]

But there is a rich heritage of coca being used for other purposes. In Latin America, it has been used by indigenous communities for thousands of years as a stimulant, appetite suppressant and food supplement, for social and ceremonial purposes, and to relieve altitude sickness. For Andean and Amazonian indigenous communities, the practice of growing, sharing and running "town hall" meetings with coca is central to making their communities function politically, economically and spiritually. The adoption of coca products is nevertheless limited outside of South America.

Following the arrival of the Spanish *conquistadores*, indigenous culture and everything connected with it was denigrated. Five hundred years later, indigenous people are the most marginalised group in Latin America, with poverty rates often far above the national average. They are still fighting for the recognition of fundamental rights and are largely excluded from national political life. It is no coincidence that it was Bolivia, after the election of an indigenous president and former coca grower, that made the most progress in legally regulating and culturally asserting the many uses of the coca leaf.

In the mid 19th century, in the years following the isolation of cocaine, the Western world began to take advantage of some of the commercial possibilities presented by the new drug. Cocaine became a veritable elixir. Sigmund Freud famously said that its use led to "an increase of self-control" and an increased "vitality and capacity for work." Cocaine had many

[1] Santacecilia, M. Why is Colombia's cocaine production so high?, DW, 27 June, 2019 https://www.dw.com/en/why-is-colombias-cocaine-production-so-high/a-49381157

applications: it was used in pain relief and hair treatment, and infused in wine and cigarettes. Coca Cola, which was first sold in 1886 as a medicine, was made with extracts from the coca leaf, and today this extract remains part of its formula. Stepan, the company responsible for producing that extract, holds the sole license in the United States, granted by the Drug Enforcement Administration (DEA), allowing for the legal importation of coca leaves. The cocaine - or more precisely the ecgonine alkaloid - that is removed during the chemical process is sold to a company in Missouri which then purifies it, ready for medicinal application.[2]

With time cocaine was seen as a harmful drug rather than a medicine, and its use is now considered a damaging vice. Meanwhile, its previous niche as a local anaesthetic is dwindling in the pharmaceutical market, owing to its replacement with synthetics that achieve the same functions. But in recent years, the legalisation of the cultivation of cannabis, the creation of regulated markets, and the development of products like CBD oil and their widespread acceptance, have spurred interest in the potential of the coca leaf.

Medical Opium and Cannabis: Lessons Learned

The case of Coca-Cola demonstrates one of the possible uses of the coca leaf, as does the sale of the extracted cocaine to the medical industry. For now, however, legal licensing for commercial application exists only in isolated cases. A market for opium, in contrast, has been in place for a long time and today a select group of countries legally produce opium to supply the medical industry. The primary producers of legal opium for medicinal use are Australia (Tasmania), France, Spain, India and Turkey, while a number of other countries produce smaller quantities for export or domestic consumption.[3]

Turkey is an interesting example of a major producer of illegal drugs that later became a legal opium producer. In 1974, with support from the United States, the Turkish government began to grant licenses for the legal cultivation of opium poppies. The state made a deliberate choice to organise the production process: as opposed to the highly industrialised system used in

[2] Coca-Cola's privileged position was achieved through high-level lobbying activities during the formulation of the 1961 Single Convention on Narcotic Drugs. See, Bewley-Taylor, D., Jelsma, M., Regime change: Re-visiting the 1961 Single Convention on Narcotic Drugs, International Journal of Drug Policy, Volume 23, Issue 1, January 2012, pp 72-81

[3] The licensing for morphine and thebaine is separated, and India has right to export opium latex.

Australia, tens of thousands of Turkish farmers were granted the right to cultivate opium on small plots of land.

The licensing system is controlled by the Ministry of Agriculture, which also owns the processing facility that extracts opium from the poppies. The country, once the source of around 80% of the illegal heroin entering the United States, today has tens of thousands of farmers employed by the state to produce licit opium, with an export value of around 60 million dollars. The evidence suggests there is no longer any illicit opium cultivation taking place in Turkey. However, while this strategy was undoubtedly a national success, the impact on global opium cultivation was minimal: cultivation for the illicit market simply shifted elsewhere.

The labour-intensive production system adopted by the state meant large numbers of agricultural workers could be absorbed by the new trade. Turkey also has a strong agricultural sector, serving markets in Europe and the Middle East with a range of products, and the country is self-sufficient in food production - something that is far from the case in Colombia, where agricultural imports have increased enormously in the past thirty years alongside economic deregulation. The Turkish case is an illuminating example of how the state could actively intervene to use the emergence of a new market opportunity to create beneficial social outcomes. However, it should be noted that the market for medical products derived from opium is not typical. Morphine, Thebaine and other derivatives are classed as vital medicines with significant and assured global demand. The trade in opium is also tightly controlled. In 1981, for example, the US agreed to purchase 80% of its licit opiate needs from Turkey and India – the so-called 80/20 rule.[4] This enormous advantage has allowed Turkey to maintain a cultivation model that is less productive than other countries, but that nevertheless does not imply a loss of market share. Turkey, India, Tasmania, Australia and others are producing licit opiates in what is essentially a controlled, guaranteed market. For now, no such assurances are offered by the market for products derived from coca. However, if pharmaceutical or 'phyto-therapeutic'[5] products are eventually derived from coca, opium has laid a foundation, demonstrating how cultivation, production and sale can be successfully controlled and regulated by the state.

[4] For discussion see Mansfield, D., An Analysis of Licit Opium Poppy Cultivation: India and Turkey, April 2001 http://www.davidmansfield.org/home/docs/field/4.pdf

[5] Phyto-therapeutic products refer to whole plant medicinal products, such as extracts or tinctures, that have not been chemically isolated.

Cannabis, for many reasons, provides a more pertinent example of how an illicit crop can become the source of new market opportunities. The medicinal market for cannabis is growing, and there is significant potential in the so-called 'recreational' market: the number of non-medical users is considered, conservatively, to be around 200 million.[6] Cannabis is cultivated under license around the world and is sold to serve both medical and non-medical markets. Progressive legalisation, particularly in the United States, has allowed both academic and private research into the applications of cannabis-derived products.[7] Despite the industry's rocky start and continued growing pains, Colombia is already a major producer of legal cannabis, with companies operating under a licensing and quota system, and it could become the largest exporter in the Western hemisphere; medical cannabis exports are soon expected to overtake those of cacao.[8] Foreign and national companies have invested in production facilities in the country, anticipating the growth of the market as legalisation measures spread.[9] Imports of cannabis-based products are currently restricted in the United States, but a relaxation of these laws could further support producers in countries such as Colombia, with lower costs and more favourable climates, boosting local investment and export opportunities.

In the United States, a long political struggle, including political activism and litigation by grassroots movements, paved the way for the creation of a regulated market for cannabis. The legalisation of cannabis for medical use pre-empted more relaxed legislation regarding non-medical usage. In 2012, legalisation for non-medical purposes began with ballot initiatives in the states of Washington and Colorado.[10] Around the same time, at the national level Uruguay went further, legalising the domestic market for cannabis – whether medical,

[6] As is the case with any illegal market, such figures should be treated with caution. UNODC, World Drug Report 2019: 35 million people worldwide suffer from drug use disorders while only 1 in 7 people receive treatment, 26 June 2019 https://www.unodc.org/unodc/en/frontpage/2019/June/world-drug-report-2019_-35-million-people-worldwide-suffer-from-drug-use-disorders-while-only-1-in-7-people-receive-treatment.html

[7] To give an example, the use of CBD oil to reduce instances of psychosis in patients with Parkinson's disease. Zuardi, A.W. et al., Cannabidiol for the treatment of psychosis in Parkinson's disease, Psychopharmacol, 2009 Nov; 23(8): pp 979-83. https://www.ncbi.nlm.nih.gov/pubmed/18801821

[8] Fonnegra, M., Exportaciones de cannabis medicinal superarían las del cacao, El Tiempo, 22 September, 2019 https://www.eltiempo.com/justicia/exportaciones-de-cannabis-medicinal-superarian-las-del-cacao-414874

[9] According to Rodrigo Arcila, president of the Colombian Cannabis Association (Asocolcanna), investors spent 600 million US dollars in three years on medical cannabis facilities – farms and laboratories - in Colombia. Delgado, D. Medical Cannabis Exports in Colombia Promise Massive Market Potential, Cannabis Business Times, 13 February 2020 https://www.cannabisbusinesstimes.com/article/colombia-medical-cannabis-exports-rising/

[10] For medical marihuana the shift came earlier: for example, in Colorado, a law passed in 2000 allowed the purchase of marihuana with medical consent.

recreational or industrial. "These policy shifts," observes a report on the history of cannabis legalisation, "go well beyond the permitted prohibitive boundaries of the UN drug control conventions. They represent a break with an historical trajectory founded on dubious science and political imperatives." [11] Today, every US state allows some form of marihuana or CBD oil to be used legally for medical purposes.

As the legalisation of cannabis for medical use took place in several countries, demand was created for derivative products. Research institutions and private companies therefore required a legal means of researching new product developments. In the United States, cannabis used for medical and scientific research had in the past been highly controlled; the DEA determined cannabis could only be produced for research at the University of Mississippi.[12] Since 2016, however, that has changed, and institutions can now apply to the agency for permits to grow cannabis for research purposes. The importation of cannabis and its derivative products nevertheless remain restricted and require individual DEA approval.

The progression of cannabis legalisation was roughly defined by the following stages:

- Widespread illicit use
- Political pressure to legalise medicinal and compassionate use (i.e. HIV crisis, child epilepsy), serving as a basis for wider social legitimation
- Scientific legitimation for medical uses
- Medicinal licensing and product development
- The growth of quasi-medical markets
- Political pressure to legalise recreational use
- Decriminalisation of personal possession[13]
- Staggered legalisation and acceleration of medical research
- Gradual growth of business opportunities (first medical, then recreational)
- International market boom, further research and product development

[11] See: Jelsma, M., Bewley-Taylor, D., Blickman, T., The Rise and Decline of Cannabis Prohibition - The History of Cannabis in the UN Drug Control System and Options For Reform, The Transnational Institute/GDPO, March 2014 https://www.tni.org/files/download/rise_and_decline_web.pdf

[12] Hudak, J., Stenglein, C., AG Sessions blocks progress on medical cannabis research, Brookings Institution, 25 October 2017 https://www.brookings.edu/blog/fixgov/2017/10/25/ag-sessions-blocks-progress-on-medical-cannabis-research/

[13] In the US case, decriminalization in many states came earlier, during the Nixon administration.

Non-medical adult cannabis use is now legal in eleven US States. And around the world there have been reductions in penalties for possession of cannabis for personal use or decriminalisation. A transformation in the legal interpretation and the market development of an illicit drug has taken place in two decades. Under these new conditions, the market for legal cannabis-derived products, either for medical or non-medical use, has grown substantially. In particular, the legalisation of cannabis has led to significant research into Cannabidiol, commonly known as CBD. The second most prevalent active ingredient of cannabis, CBD does not cause addiction, and the psychoactive element of cannabis – Tetrahydrocannabinol or THC – is reduced to negligible levels. CBD oil is an anti-inflammatory and has many applications, including pain relief and stress management. The market for CBD, notes a study cited by Business Wire, "is poised to grow by USD 3.52 billion during 2020-2024." This growth "is driven by the health benefits of CBD oil," and "the growing legalization of cannabis-based products is anticipated to further boost the growth of the CBD oil market." [14] CBD oil companies now sell a diverse range of products, from gummies to sport supplements, and many of them sponsor celebrities and professional athletes; a demonstration of the level of popular acceptance.

The legal situation of cannabis cultivation in Colombia is interesting, shedding light on one of the many contradictions in the markets for products derived from plants which have long been considered illegal. Cannabis-derived products for medical use, such as CBD oil, are now being created in Colombia almost exclusively for export. This has been achieved through licensing procedures granted by the National Narcotics Fund, the Ministry of Health, the Ministry of Agriculture and the Ministry of Justice and Law. However, cannabis-based products face enormous barriers in the local market. Cannabis companies based in Colombia are placed in the contradictory position of being able to use the excellent local conditions for cultivation in order to export to countries with more progressive drugs laws, but are currently restricted in the local market, with a complicated regulatory pathway to supplying in-country demand. The Colombian state, therefore, tacitly recognises the right of foreign populations to consume these products, but it has not extended the same rights to its own citizens. Nevertheless, Colombia has shown it can regulate the cultivation of an illicit crop as well as the production of derivative products; in fact, Colombian legislation is among the most

[14] Technavio, CBD Oil Market by Product and Geography - Forecast and Analysis 2020-2024 , November 2019, https://www.businesswire.com/news/home/20200109005462/en/Global-CBD-Oil-Market-2020-2024-Evolving-Opportunities

advanced in the world. This creates a route that can be followed by coca – a crop that should not lack the high entry costs associated with medical cannabis production.[15]

However, it should be recognised that there is a significant difference between coca and cannabis: the present level of demand. The market for cannabis was large even before legalisation; in many ways the demand was an impetus for that same legalisation process. While the market for recreational cocaine is significant, the demand for coca-based products is far smaller, and in Peru and Bolivia is already covered by national production. Therefore, the impetus for business investment, which existed in the case of medical and non-medical cannabis, is not yet present in the case of coca. The emergence of such a level of demand would require a significant rise in demand for coca-based medicinal, alimentary or even recreational products both in South America and other areas of the world, particularly North America and Europe. Unlike cannabis, legalisation would need to pre-empt the demand.

The case of coca, when compared with cannabis, shows similarities and significant differences. The use of the coca plant is not harmful, and it does not have the attached stigma of a 'gateway' to harder substances. Legalisation in Peru and Bolivia has led to progress: coca-based products are widely available and employment has been created for farmers cultivating coca under license. In Colombia, where the legislative measures are less advanced, unlicensed coca tea and other products can be purchased across the country; although this is technically illegal, because no products have been licensed for sale outside of indigenous territories, no punishment is presently enforced. So far, however, other countries have not felt pressurised, or incentivised, to legalise the import of coca and coca-based products.

Industrialisation and Counter-Narcotics

The emerging possibilities for the legalisation and industrialisation of coca have led to claims that it could provide a solution to illicit cultivation and the crisis in Colombian agriculture. As has occurred in Bolivia, the legalisation of coca production for local sale, through a licensing system, could create a legal option for coca farmers, and would no doubt be beneficial. But it is over-optimistic to consider legalisation, or subsequent industrialisation, as a solution to the cultivation of illicit crops. In strict terms, the legalisation of coca would mean the creation of a new agricultural product. Industrialisation would imply climbing the value

[15] The high-quality cannabis grown indoors requires grow lamps, as well as control of temperature and humidity.

chain, much in the same way as countries that cultivate cacao decide to process the bean into chocolate before export. Although beneficial, this does not necessarily imply development, nor can it overcome the structural factors that have caused the progressive decline of Colombian agriculture. In much the same way, the legalisation of an illicit crop does not imply that cultivators will simply shift from illegal to legal activity. Without market-building innovations, the demand for legal coca would not be able to compete with the illegal product. And there is no indication the new industry would be able to absorb a significant portion of the farmers currently involved in illicit cultivation, who number in the hundreds of thousands. This dynamic, which is becoming clear regarding traditional small-scale cannabis famers in countries like Morocco, Jamaica and Colombia, must be kept in mind during the transition to a licit medical market.

If Colombia commits to a national development model that creates decent work for the large proportion of the population who are marginalised – 60% of employment in the country is informal – and adopts an agricultural policy that ensures stable incomes and food security, then the benefits of coca cultivation, and the implications for the countryside, will be far greater. Coca legalisation can be supplemental to development and counter-narcotics, but in isolation the impact is likely to be small.

The way in which production is organised will have implications for development. Various models could be adopted, and, as the experience with legal cannabis has demonstrated, it is not guaranteed that Colombian farmers will be the beneficiaries. The Financial Times recently noted that in Colombia "some local growers fear that without the backing of North American cash, they will be squeezed out of the cannabis market by a few big players." This tendency is enhanced by the high start-up costs associated with growing cannabis and the lack of government support for community initiatives. Determining who owns and controls supply, processing, distribution, marketing and sales will have implications for national development. Though Colombia's medical cannabis regulation seeks to encourage value-added activities to remain in the country, there are worrying signs: already the majority of the companies licensed to grow medical cannabis are owned by foreign capital, and there are indications that many farmers, rather than cooperatively seeking licenses, are being contracted to work on plantations.

The way in which the cannabis market has developed offers many lessons, and many possible pitfalls. The hopes that the creation of regulated cannabis markets would lead to fairer means

of organising production have not been realised. "Serious concerns," notes a report by Swansea University's Cannabis Innovate project , "are growing about the unfolding market dynamics, particularly the activities of many for-profit cannabis companies from the Global North and the threatened exclusion of small-scale and marginalised farmers from traditional cannabis producer countries in the Global South."[16]

In the case of coca, start-up costs are lower, meaning there are greater possibilities for *campesino*-managed initiatives. But the success will most likely depend on government policy: if the market is left to its own devices – and depending on demand - large businesses will most likely dominate production. Bolivia provides a useful example: coca is cultivated by farmers who are registered with the government and allowed to cultivate only a limited area of coca. The restriction of the market keeps prices relatively high and the benefits accrue to the farmers. A key policy challenge will be how to create an environment in which grower communities benefit from both legalisation and industrialisation.

Medical Coca: A Latent Potential?

The only country that legally exports the coca leaf is Peru, and the United States accounts for almost all of global imports. Cocaine for medical usages, meanwhile, is manufactured primarily in the United States and the United Kingdom, which is also the largest importer. In 2018, the total amount of licit manufactured cocaine reached 153.9kg and the total licit consumption attained a record high of 724.1kg.[17]

Coca is therefore already being used for legal alimentary, nutritional and medical purposes. But the research on the potential benefits of coca, which belongs to the genus *Erythroxylum*, remains in its early stages. The most comprehensive review thus far was published last year by the scientific journal *Molecules*. "The science regarding whole coca's risk profile and productive applications remains limited," note the authors of the study, "both due to the paucity of research on this topic and the need to replicate and enhance existing studies." For this reason, "a full characterization of coca's alkaloid and nutrient content with contemporary

[16] Jelsma, M., Kay, S., Bewley-Taylor, D., Fair(er) Trade Options for the Cannabis Market, Cannabis Innovate – Swansea University, March 2019 https://www.tni.org/files/publication-downloads/fair_trade_options_for_the_cannabis_market.pdf

[17] INCB, Report of the International Narcotics Control Board for 2019, 2020 https://www.incb.org/incb/en/publications/annual-reports/annual-report-2019.html

techniques remains absent and thus hinders further research studies in this area." However, "traditional medicine, the incipient research available on coca, and the findings from related *Erythroxylum* species indicate that there is potential for addressing the coca research gap and developing coca's productive applications."[18]

According to the available evidence, phyto-therapeutic coca-based products have the potential to: i) improve weight management and glucose regulation; ii) be used as a means of maintenance therapy for people who use illicit stimulants; iii) and assist with respiratory rehabilitation. Further research into these areas, the review notes, could have fruitful results. One challenge for any new product method would be the application method. While cannabis oils have found success either in capsules or drops, coca would most likely need to be taken in the form of a powder held in the mouth, in a similar manner to 'snus' or dipping tobacco. [19]

What are the legal obstacles to further development of coca-based products in Colombia? The use of the coca plant for medicinal and scientific purposes has been legal since the 1980s. But today even the legal situation for traditional uses of the coca plant is not clear. Indigenous communities that produce coca-based products for consumption in Colombia operate in a legal grey area. The past few years have seen steps both forwards and backwards in legal terms. In 2018, a decree created the legal route for the creation of phyto-therapeutic products from plants defined as 'controlled substances'. Any potential products must register with INVIMA, the National Institute for Food and Drug Surveillance, which is responsible for controlling and regulating any production of pharmaceutical products. INVIMA requires proven research findings regarding safety, effectiveness and contraindications. The legal path has therefore been defined, but the costs are restrictive. The development of legal coca-based phyto-therapeutic products will require further research into the chemical components of different plant species, the bioavailability of the leaf's contents, acute toxicity tests and scientific proof of any therapeutic or phyto-therapeutic properties. Such research would

[18] Restrepo, D.A.; Saenz, E.; Jara-Muñoz, O.A.; Calixto-Botía, I.F.; Rodríguez-Suárez, S.; Zuleta, P.; Chavez, B.G.; Sanchez, J.A.; D'Auria, J.C., Erythroxylum in Focus: An Interdisciplinary Review of an Overlooked Genus, Molecules 2019, 24, 3788.

[19] On the uses of snus, see Nocera, J., Snus Can Save People From Cigarettes. Just Ask Sweden, Bloomberg, 23 October 2019 https://www.bloomberg.com/opinion/articles/2019-10-23/snus-are-much-safer-than-cigarettes-just-ask-sweden

require hundreds of thousands of dollars of investment, at least. Given the costs, this research is unlikely to be carried out by the indigenous communities that produce coca.[20]

As cannabis has done, any future coca industry will have to deal with the labyrinthine problems contained within the international treaties on narcotics drugs, and their implications. However, medical production is less restricted under the treaty regime, and cannabis has demonstrated that the obstacles are not insurmountable. CBD oil provides a useful example of how these barriers can be overcome. Much like coca in Colombia, CBD oil sold in the United States falls into a legal grey area. "All 50 states have laws legalizing CBD with varying degrees of restriction," notes an article published by Harvard Medical School. However, "while the federal government still considers CBD in the same class as marijuana, it doesn't habitually enforce against it." CBD oil is also marketed mostly as a dietary supplement, rather than a medication, and therefore it is not regulated by the Food and Drug Administration (FDA).[21] As noted above, academia has had a significant role to play in investigating the medical uses of cannabis, albeit, until recently, under strict conditions. CBD first attracted academic and medical interest for its use in the treatment of epilepsy in children. And this was assisted by the 2015 decision of the FDA to reduce the requirements necessary to carry out CBD trials. In 2017, the National Academies of Sciences, Engineering and Medicine produced a report in which they called for more research on cannabis. Two years later, the National Institutes of Health, the US government body focused on biomedical and public health research, announced 3 million dollars of research grants would be dedicated to study the pain relief properties of CBD. As the Associated Press noted, the impetus may have been partly political, given "the nation's opioid addiction crisis, with its roots in overuse of prescription painkillers," which "has sparked new scientific interest in marijuana's pain-easing properties."[22]

This research, supported by the state, has potential benefits for public health, as well as private enterprise, which will benefit from any positive findings, and will be responsible for bringing

[20] Rodriguez-Suarez, S., Restrepo, D., Aguirre, P., La COCA LEGAL: posibilidades y desafíos normativos para usos fitoterapéuticos de la hoja de coca en Colombia, CESED, Universidad de Los Andes, 2020 https://cesed.uniandes.edu.co/wp-content/uploads/2020/05/LA-COCA-LEGAL-POSIBILIDADES-Y-DESAFIOS-NORMATIVOS-PARA-USOS-FITOTERAPEUTICOS.pdf

[21] Grinspoon, P., Cannabidiol (CBD) — what we know and what we don't, Harvard Health Publishing, Harvard Medical School, 24 August, 2018 https://www.health.harvard.edu/blog/cannabidiol-cbd-what-we-know-and-what-we-dont-2018082414476

[22] Johnson, C. US awards $3M to fill gaps in medical marijuana research, Associated Press, 19 September 2019 https://apnews.com/6c7f1be6ed7a440680aada789e61b10f

new products to market. And yet, the Colombian state, perhaps for ideological reasons, lags far behind, and has so far refused to take advantage of the possible benefits of research on the coca leaf.

Conclusion

The potential benefits of the coca leaf have yet to be fully explored. Cannabis and opium, and the licit markets they serve, provide many lessons and many pitfalls for any future development. Perhaps the most important is the State's ability to determine progress, to encourage research, and to choose who benefits. In Turkey, the state recognised that entering the licit opium market – albeit under exceptional conditions – created the possibility to organise production in a way that benefitted farmers. Legal cannabis has not developed in the same way: many of the hopes for new, more equitable means of cultivation and production have been crushed by the experience of the past few years.

Although the different experiences of opium and cannabis within legal regulated markets provide many lessons for coca, we should be careful not to equate the crops, or to expect them to follow the same path. It was medical application that spurred the legalisation of the cultivation of opium poppies. The same is true of the recent wave of policy shifts regarding cannabis; in the US, medical use arguably helped open the door for recreational legalisation. The demand for both products was long proven, and once legalisation took place – albeit partial and limited – the business world was ready to exploit the new market opportunities.

The scenario for coca is somewhat different. Given the limited demand in Colombia, research and product development would be needed to create a new, more substantial market. Export opportunities are also presently very limited. These facts, however, are not obstacles to full legalisation in the manner of Peru and Bolivia. The controlled cultivation of cannabis has demonstrated the country's capability to regulate the production, sale and export of a formerly illicit crop. The legislative leap that will allow the possibilities of the crop to be better exploited does not seem impossible to achieve in the near future.

It is evident, however, given the kinds of crop-substitution initiatives being supported in Colombia, that experts and policy makers consider coca to be just another agricultural product, although one without the export potential of some alternative crops. Colombia's recent experience with medical cannabis has increased concerns that legalisation may simply

lead to corporate control and cultural appropriation with limited, or no benefit for traditional or vulnerable communities.

The pertinent question for policy makers is how to create a legal environment for the cultivation and development of an agricultural product that can be used for illicit purposes. The latest research demonstrates the potential phyto-therapeutic uses of coca.

In order for further progress to be made, three key steps will be:

i) Support for research into the medical uses of the coca plant, based on fair benefit sharing and preferential access for traditional communities that protects hard-earned cultural rights;

ii) Expansion of the licensing for coca cultivation, leveraging lessons from both Bolivia and Peru (as well as Turkey), and the recent experiences with legal cannabis cultivation in Colombia

iii) legalisation of the sale of approved, coca-based products.

The legalisation and industrialisation of coca could have many positive benefits for Colombia. A new agricultural product, with potential medical applications and possibilities for progress along the value chain, would enter the market. Decades of expertise could be directed towards licit ends. National demand for coca and coca-based products could with time be supplemented by export potential. In the case of coca, it is clear that the barriers to further legalisation and industrialisation are not technical or economic, but political. The country's ability to surmount this obstacle will determine whether coca follows in the steps of cannabis and opium, or is condemned to be left behind.