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Drug laws, bioprospecting and the agricultural heritage of *Cannabis* in Africa

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For centuries across most of Africa, farmers have valued Cannabis for multiple reasons. Historic crop selection produced genetic diversity that commercial bioprospectors value for marijuana production. African colonial and post-colonial administrations devalued the crop, enacted *Cannabis* controls earlier than most locations worldwide, and excluded *Cannabis* from agricultural development initiatives. Public agricultural institutions exclude *Cannabis* as an extension of drug-control policies. Only private companies conserve crop genetic diversity for psychoactive *Cannabis*, without recognizing intellectual property rights embedded in landraces. *Cannabis* decriminalization initiatives should stimulate evaluation of its roles in African agriculture, and of worldwide control and management of its genetic diversity.

Keywords: economic development; drug policy; intellectual property; marijuana; seed

Agricultural development initiatives reflect political opinions about particular crops, and the control of agricultural inputs and knowledge. Seed systems particularly reveal political differences about farming, because seeds represent the fundamental knowledge and inputs of agriculture (Kloppenburg, 2005). Improved seed, including hybrid and genetically modified crops, is an especially contentious topic. Debates about improved seed are far-reaching, ranging from the political-economic structure of agricultural systems, to the nature and control of intellectual property rights (IPRs) (Dutfield, 2004; Institute of Development Studies, 2011; Yapa, 1996).

Efforts to improve African agriculture commonly propose that farmers lack high-quality seed (Pingali, 2012). In particular, the Alliance for a Green Revolution in Africa (AGRA), a major initiative working in 17 countries and funded by the Gates and Rockefeller Foundations, posits that African farmers must replace indigenous landraces with improved, hybrid seedstock distributed through private seed suppliers (Toenniessen, Adesina, & DeVries, 2008). AGRA's seed programme was the first of its six initiatives to be funded, in 2006, and has had more funding than any other (AGRA, 2015).

Critics argue that AGRA and similar initiatives devalue indigenous knowledge by seeking to replace landraces and to transform seed systems from open exchange networks amongst farmers to commercial networks controlled by agribusinesses (Jarosz, 2012; Mbilinyi, 2012; Scoones & Thompson, 2011; Thompson, 2012). AGRA's success would reduce the capacities of existing

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seed systems to respond to site-specific needs, and hinder farmers from selecting crop attributes through seed saving (African Center for Biodiversity, 2013). Further, AGRA inconspicuously depends upon unimproved seedstock, because this is a vital source of genetic diversity in crop improvement efforts (Smith, Bubeck, Nelson, Stanek, & Gerke, 2015). By failing to acknowledge IPR embedded in indigenous seedstock and to share improved seed openly with the farmers who contributed seeds to research efforts, AGRA facilitates biopiracy – taking of genetic wealth without benefit sharing – by multinational seed companies (Thompson, 2012).

Scholars of agricultural development have not considered the commercial marijuana seed industry, which occupies a unique position: its discourse echoes critics of seed-improvement initiatives, while its practice exemplifies the private, high-tech seed system these initiatives champion.

The commercial marijuana seed industry is large and growing. In 2002, there were 29 "seed banks" doing business over the Internet (Cervantes, 2002). By August 2015, there were 354 (Seedfinder.eu, n.d.). Commercial growers – at least those in Europe and North America – see Africa's *Cannabis* seedstock as a valuable, underexploited resource. "Africa" is an important label on commercial seeds, second only to "Dutch" and "Amsterdam". Company names include African Seeds, Afropips and Seeds of Africa, which seeks to preserve "the legendary [*Cannabis*] strains of Ancient Africa" so that "humanity […] will not lose them forever in a world dominated by hybridised […] varieties" (Seeds of Africa, 2013). The most public advocate of Africa's seedstock is Green House Seed Company, whose Strain Hunters bioprospecting documentaries had nearly 10 million views on YouTube by December 2015 (Strain Hunters/YouTube, n.d.). The Strain Hunters have sought *Cannabis* landraces in Malawi, Swaziland, Morocco, Jamaica, Trinidad, St. Vincent, India and Colombia. Importantly, the seed industry is just the visible component of commercial bioprospecting. *Cannabis*-focused pharmaceutical companies – principally Amsterdam-based HortaPharm – have large germplasm collections (Breen, 2004), but do not publicize their bioprospection.

In practice, the marijuana seed industry exemplifies the problems AGRA's critics identify. The industry appears to be heavily concentrated in two Amsterdam-based businesses, Sensi Seeds and Green House Seed Company. These companies (and HortaPharm) use African germplasm in sophisticated breeding programmes, yet acknowledge no IPRs for African farmers and offer no obvious benefits to them. Marijuana seed catalogues almost exclusively offer high yielding, hybrid cultivars (see https://sensiseeds.com/en and http://www.greenhouseseeds.nl/shop).

The parallel between the marijuana seed industry and the seed system AGRA envisions suggests that the fundamental difference between legal agriculture and drug farming is crop choice. However, *Cannabis* is generally not analysed in agricultural terms. Globally, marijuana is primarily a tropical export crop, although production is increasing rapidly in the Global North (Bouchard, Potter, & Decorte, 2011). Agricultural development initiatives in the Global South entirely exclude illegal crops and underemphasize non-food crops generally, even though farmers sometimes choose these crops where food-crop markets are unprofitable. Drug *Cannabis* production responds to prices for legal crops worldwide (Bouchard et al., 2011; United Nations Office on Drugs and Crime [UNODC], 2015), including in African countries where it has been illegal for decades though farmed for centuries. African *Cannabis* landraces persist despite the constraints drug-control laws place on crop selection.

In this paper, I examine the origins and implications of the current situation, wherein African *Cannabis* is simultaneously illegal and a valuable stock of crop genetic diversity. My central argument has two components: (1) African *Cannabis* landraces are diverse because they represent centuries of agricultural selection and (2) African farmers cannot legally produce

Cannabis because drug-control laws devalue the agriculture expertise embedded in the crop. This argument is based on political ecological analysis (Offen, 2004) of historic accounts of farming, and of initial drug laws across the continent. Drug-policy reform is transforming the global political economy of *Cannabis*, yet there has been scant consideration of the implications this transformation might have for agriculture in Africa. I contribute to the relatively thin literatures on *Cannabis* geography (Warf, 2014), and *Cannabis* history in Africa (Akyeampong, 2005; du Toit 1980; Klantschnig, 2014; Kozma, 2011; Paterson, 2009). I generalize about Africa and African farmers to emphasize political ecological conditions that have existed broadly across the continent; nonetheless, I recognize that there are and have been important variations in these conditions.

This remainder of this paper has four sections. First, I define key terms. Next, in two sections I sketch the agricultural past of *Cannabis* in Africa, and outline how drug laws denied the crop's value. Finally, I discuss implications of global drug-policy reform with regard to *Cannabis* in Africa.

Terminology

In this paper, I write "*Cannabis*" to discuss a botanical genus. All *Cannabis* plants produce cannabinoids, a class of over 80 phytochemicals. The most important taxonomically are cannabidiol (CBD) and tetrahydrocannabinol (THC), the primary psychoactive compound. Regarding species, I follow Hillig's concept (2005a) that there are two major groups within *Cannabis*. Simplistically, plants that produce a high THC:CBD ratio are the genetic species *indica* (sensu Hillig), while plants with a high CBD:THC ratio are *sativa* (sensu Hillig). This concept differs from the current, formal taxonomy that considers all plants to represent one species, *Cannabis sativa* L. (Small & Cronquist, 1976). However, genetic analyses support recognition of two species (van Bakel et al., 2011; Datwyler & Weiblen, 2006; Hillig & Mahlberg, 2004; Sawler et al., 2015).

Cannabis indica grows outdoors primarily at low latitudes (approximately < 35°); it is found throughout Africa, except in the driest areas. *C. sativa* grows at higher latitudes (approximately 35–65°). Initially, *sativa* grew only in western Eurasia prior to its introduction to European colonies worldwide. It succeeded in mid-latitude colonies; low-latitude introductions failed. By "African *Cannabis*" I mean the diverse landraces indigenous to the continent. By "landrace" I mean a locally adapted and distinctive population of a cultivated plant that lacks formal improvement. The term "strain" refers to a lineage of plants shaped through agricultural selection. "Variety" is a formal taxonomic rank below the sub-species.

Finally, species names are not synonymous with human uses of *Cannabis*. "Hemp" means *Cannabis* used for fibre or oilseed. By "drug *Cannabis*" I mean plants used as psychoactive or non-psychoactive substances that affect bodily function; I am concerned primarily with psychoactive drugs. The genetic species *indica* and *sativa* have both been used as hemp and drug. Hemp produced in East Asia comes from *indica*; drugs produced from *sativa* are not psychoactive because only *indica* produces a high THC:CBD ratio. By "pharmaceutical *Cannabis*" I mean drugs prepared according to Western pharmacological science.

My terminological definitions are simplified in this paper. For further discussion of *Cannabis* terminology, see Duvall (2015, pp. 9–26). For more on *Cannabis* botany, biogeography and history, see Clarke and Merlin (2013), Small (2015) and Duvall (2015).

Origins and diversity of African *Cannabis*

C. indica originated in South Asia, but arrived in Africa long ago. The earliest evidence is pollen from 650 Before the Current Era (BCE) from central Kenya (Rucina, Muiruri, Downton, &

Marchant, 2010) and 200 BCE from Madagascar (Burney, 1987). The plant experienced some degree of human selection wherever it was used, even before formal agriculture. Farming existed in Egypt by the 1200s CE (Rosenthal, 1971), and in Morocco and Kenya by the 1500s (Muller et al., 2015; Rucina et al., 2010). Smoking pipes in archaeological contexts suggest *Cannabis* use if not agriculture widely across East Africa, especially after 1000 CE (Philips, 1983; Van der Merwe, 2005). European documents, the earliest from the 1580s, suggest the plant's expansion during recent centuries (Figure 1).

In global terms, Africa is a centre of secondary diversification for *C. indica*. Its world history parallels other crops domesticated in South Asia and transferred anciently to Africa. Banana is the most notable crop with this history; African bananas are highly diverse (Carney & Rosomoff, 2009, pp. 35–36). There is scant research on the genetic diversity of African *Cannabis*. Botanists recognize three varieties characteristic respectively of North, Central and Southern Africa (Clarke & Merlin, 2013, p. 330). The only information on landraces are anecdotes from commercial bioprospectors (Strain Hunters, 2013), and participants in online discussion boards (International Cannagraphic, 2015). This information is qualitative and generally unverifiable. Nonetheless, purported landraces are physically distinctive, and from ecologically distinct areas, primarily in North, East and Southern Africa, regions where the crop was earliest present.

Generalizations about the agricultural history of African *Cannabis* are necessary because relevant literature is topically and geographically patchy. Historic descriptions of farming are brief European observations, mostly published after 1850. Although *Cannabis* widely supplied fibre

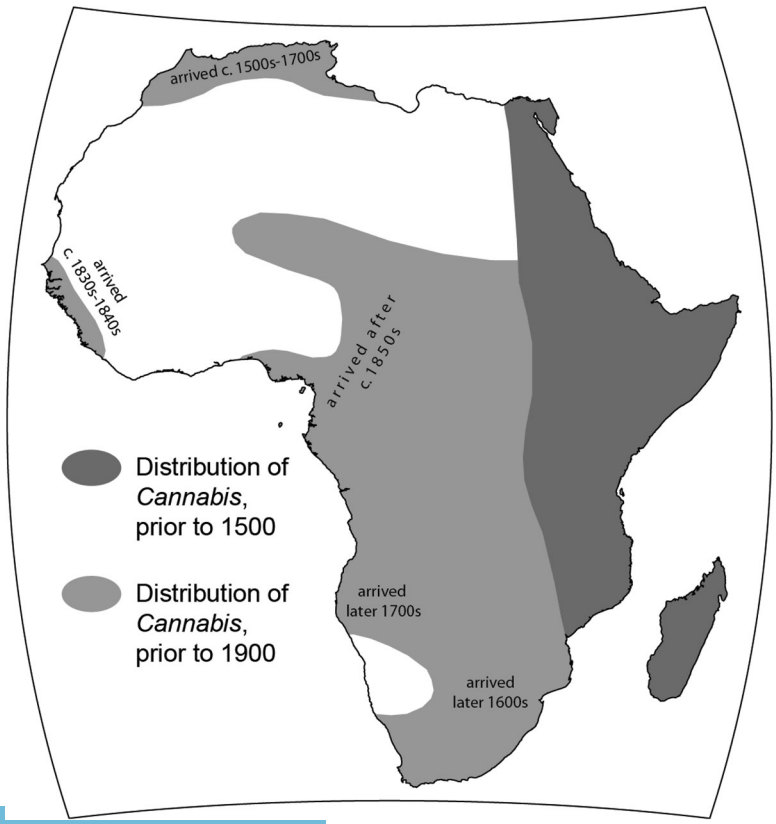

Figure 1. Historic distribution of *Cannabis* in Africa. Map data in Duvall (2015).

and non-psychoactive drugs, it was used principally for psychoactive drugs. *Cannabis* was commonly grown with minimal management on waste heaps and agroecologically marginal locations, such as rocky hillsides and field margins (e.g. Chevalier, 1944; de Ficalho, 1884/1947), but also cultivated more intensively in fertilized, irrigated patches or house gardens (e.g. Baum, 1903, p. 7; Burton, 1860, p. 81; Clarke, 1851; Daniell, 1850; Dias de Carvalho, 1892, p. 50; Du Chaillu, 1861, p. 420; Dukerley, 1866; Foureau, 1903, pp. 467, 519). In Morocco's northern lowlands, *C. sativa* was grown for hemp (du Gast, 1908, pp. 79–80; René-Leclerc, 1905, pp. 245, 347); cross-pollination between *indica* and *sativa* has distinguished the North African variety from the Central and Southern African varieties (Clarke & Merlin, 2013, p. 330).

Little is known of historic plant selection practices, which were embedded in indigenous knowledge systems. Where people did not actively manage *Cannabis* as a crop, it experienced weak selection. For instance, slaves saved seeds in western Central Africa (Du Chaillu, 1861, p. 420), but likely had no choice in plant selection. Where farmers responded to local demand for plant products, selection was stronger. For instance, in 1790s Mozambique, people harvested inflorescences for psychoactive drugs, leaves for non-psychoactive poultices, and stems for fibre, but saved seeds from inflorescences (Barroso da Silva, 1799/1864). Elsewhere, people similarly seem to have selected seeds from inflorescences used as drugs (Bourhill, 1913; Clarke, 1851; Daniell, 1850; Doke, 1931, p. 110; Godard, 1860, p. 178; Kingsley, 1897, pp. 667–668).

Past agricultural selection produced current landraces. Since the 1500s at least, African farmers have widely favoured crops that tolerate uncertainty generated by climate variability and political-economic instability (Carney & Rosomoff, 2009). *Cannabis* likely experienced similar human selection. Cultivation in marginal sites posed natural selection pressures favouring hardy, adaptable plants. Like all crops, *C. indica* benefits from fertilizers, irrigation and other inputs, but it does not require intensive management for high-potency products. Current farmers value the crop because it can succeed in marginal sites (Bloomer, 2008; Chouvy, 2008; Kepe, 2003; Laudati, 2014; Perez & Laniel, 2004).

Selection also affected plant chemistry, which determines the physiological effects of *Cannabis* drug use. There is scant evidence linking the cannabinoid profiles of specific *Cannabis* strains with specific geographic locations, beyond the broadest groups within the genus. However, landraces from Southern Africa have both distinctive phytochemistry and a documentary record of drug effects that parallels the known pharmacology of this phytochemistry. In Southern Africa, the plant drug has long been used as an appetite suppressant. In the 1580s, a Portuguese resident in Mozambique recorded that *Cannabis* "comforted [users'] stomachs [… and] sustained them several days, without eating another thing" (dos Santos, 1609, p. 20B). In 1883, a French traveller found that people in southern Tanzania valued *Cannabis* because it "calms the sufferings of hunger" (Giraud, 1890, p. 73). In Malawi in 2008, a bioprospector reported being "energized by the local weed, sometimes to the point of needing less food than normal" (Strain Hunters, 2010a). For at least the past century, South African labourers have used *Cannabis* to suppress hunger (Bourhill, 1913; Peltzer, Ramlagan, Johnson, & Phaswana-Mafuya, 2010). Marijuana aficionados in the Global North value this effect in the Southern African strains that have entered commercial production, particularly Durban Poison and Malawi Gold.

Southern African plants have elevated levels of the cannabinoid tetrahydrocannabivarin (THCV) (Backes, 2014, pp. 146–147; de Meijer, 2014, p. 101), which is an appetite suppressant (Williams, Whalley, & McCabe, 2015, p. 322). Elevated THCV production is rare globally in *Cannabis*. Hillig and Mahlberg (2004, p. 973), for instance, report only one other sample, from Afghanistan, with high-THCV levels. Although these authors interpret the rarity of high-THCV *Cannabis* as suggesting that humans globally selected *against* THCV production, the pattern as readily suggests that Southern African farmers selected *for* THCV by favouring appetite-suppressing physiological effects.

Of course, drug *Cannabis*' subjective effects depend upon historically and geographically contingent contexts of use, not just biochemistry (Zinberg, 1986). Physiological and subjective effects cannot be disentangled in documentary sources. Historically, *Cannabis* was embedded in numerous geographically specific contexts of use (du Toit, 1980; Duvall, 2015). Contexts sometimes enforced social norms that limited drug consumption: across Central and Southern Africa, people smoked in groups using a shared pipe, thereby controlling the quantity an individual smoked (Bourhill, 1913; Daniell, 1850; Reeve, 1921, p. 51). Other aspects of context seemingly affected drug biochemistry. For instance, *Cannabis* was transported in leaf-wrapped packets in nineteenth-century Central African commerce (Daniell, 1850). Perhaps this was the origin of products like "black Malawi", or herbal material fermented in cornhusk packets, which has subjective effects different from unfermented material (Seshata, 2013; Strain Hunters, 2010a). The cultural and botanical aspects of African *Cannabis* developed conjointly in local production and consumption systems.

Valorizing and devaluing African *Cannabis*

Beyond its sociocultural value, *Cannabis* has had economic value in Africa for centuries. However, beginning in the late 1800s, drug-control laws denied African *Cannabis* had any value; twentieth-century laws solidified its devaluation.

The earliest evidence of *Cannabis* drug markets in Africa is from thirteenth-century Egypt (Rosenthal, 1971). In Southern Africa, by the 1680s *Cannabis* was important in an expansive exchange economy (Gordon, 1996; Paterson, 2009, pp. 23–26). Commercial and exchange markets existed across the continent during the 1800s and early 1900s (Burton, 1876, p. 295; Clarke, 1851; Daniell, 1850; Decazes, 1888; Dukerley, 1866; Giraud, 1890; Söllner, 1897, p. 77; Welwitsch, 1862). North African markets were highly formalized by the late 1800s. In Morocco, before 1860 the royal government began selling an annual monopoly to the *Cannabis* trade (Godard, 1860, p. 179); Ottoman Tunisia followed in 1870 (Say & Chailley, 1892, p. 972). These monopolies, which represented a market-based approach to controlling consumption (Bewley-Taylor, Blickman, & Jelsma, 2014, p. 8), continued under French rule until 1954 (Chouvy, 2008).

European-controlled trades developed within colonial efforts to exploit valuable resources. These trades mostly depended upon demand from hard labourers. In South Africa in the 1700s, Dutch merchants paid Khoisan labourers with the plant drug (Gordon, 1996; Kolben, 1713/1748, p. 513); into the early 1900s white South Africans grew *Cannabis* to supply miners (Paterson, 2009, p. 50). In Angola, slavers valued the crop in their attempts to manage slave health (Daniell, 1850); slaves carried *Cannabis* seeds, including to Sierra Leone and Liberia before 1850 (Büttikofer, 1890, p. 276; Clarke, 1851). In Central Africa, the plant drug was directly commercialized after abolition. Its trade followed the same pathways as the slave trade, with shipments from interior farmlands supplying coastal markets (Silva Porto, 1885/1942, p. 231), and export markets in São Tome and Gabon during the 1870s–1900s (Ivens, 1898; Trivier, 1887). By 1910, European traders in Gabon stocked locally grown *Cannabis* (Seguin, 1910). Elsewhere, Portuguese Mozambique exported the plant drug to British Traansvaal between 1908 and 1913 (Foreign Office and Board of Trade, 1912, 1916). Except in Morocco and Tunisia, legal commerce ended in the 1910s, by which time most African colonies had prohibited drug *Cannabis*.

Even after *Cannabis* was outlawed, it retained value. Black markets grew throughout the 1900s. In Southern and Central Africa, miners were prominent consumers (Higginson, 1990; Laudati, 2014; Paterson, 2009, p. 50). In West Africa, Sierra Leonean merchant sailors trafficked *Cannabis* from Gambia to Nigeria, and transported at least small quantities to New York City by

1938 (Akyeampong, 2005). Colonial troops also carried *Cannabis* widely (du Toit, 1980). Domestic and international trading grew in the 1960s, as middle and upper social classes worldwide adopted the drug (Ellis, 2009; Klantschnig, 2014). In the 1960s, Morocco began producing hashish for export (Chouvy, 2008); farmers have increasingly planted high-yielding strains from Afghanistan and Pakistan, and Moroccan landraces are declining (Strain Hunters 2010b). Since the 1980s, continental production has increased continually (Perez & Laniel, 2004). Domestic markets are important (Kepe, 2003; Laudati, 2014), but trafficking widely links supply and demand across borders (Bloomer, 2008; Bøås, 2014; Ellis, 2009; Perez & Laniel, 2004). Currently, only Algeria, Egypt and Morocco export significant quantities beyond the continent – hashish bound for Europe (UNODC, 2015).

As European-controlled *Cannabis* trades developed, colonial regimes simultaneously began suppressing non-pharmaceutical *Cannabis* drug use, which was increasingly perceived as a health risk. *Cannabis*-control laws were enacted across the colonial world beginning in the late 1800s (Bewley-Taylor et al., 2014; Duvall, 2015, p. 163; Kozma, 2011). African colonial laws were generally earlier than elsewhere. Before *Cannabis* was first listed in a global drug-control agreement – the League of Nations' 1925 International Opium Convention – its farming, possession, and use were prohibited across most of Central, East and Southern Africa (Table 1). Only Turkey and Greece seem to have enacted similarly stringent prohibitions by 1925 (Bewley-Taylor et al., 2014).

Africa's initial laws mostly mentioned public health as justification (Table 1). Some laws sought to control pharmaceutical practices, though most aimed only generally to protect "native" health. Angola's 1913 law, for instance, stated that *Cannabis* "contribut[ed] to degeneration of the race, [and] debilitation of the native". Its control was based on the "great advisability of […] restricting the native customs that are absolutely harmful to them" (Ministério das Colónias, 1918, p. 262). Indeed, most *Cannabis*-control laws served ulterior concerns, particularly labour control (Higginson, 1990, p. 251; Paterson, 2009; Payeur-Didelot, 1898; Redinha, 1946, p. 27) and religious proselytizing (Hunt, 1999, p. 56; Reeve, 1921, p. 180). Several laws identified specific labour groups, including Angola's law that sought to end drug-taking amongst colonial troops, and make farmers shift to tobacco production (Ministério das Colónias, 1918, p. 262).

Colonial laws effectively excluded *Cannabis* from legal agriculture, even if its consumption continued. Most laws not only prohibited *Cannabis* farming, but ordered the destruction of fields and produce, thereby legally redefining agriculture by excluding a crop based on European prerogatives. Colonial regimes broadly devalued African farming expertise *Cannabis*-control laws specifically devalued the crop in several ways.

First, *Cannabis* was portrayed as a one-dimensional drug crop, only a poor, "native" substitute for tobacco. No laws recognized non-psychoactive, indigenous uses, which were widespread even if secondary. Many Europeans were ignorant of these because they focused on the exotic psychoactive use, which seemed wasteful because they presumed the plant was most valuable for fibre, as in Europe (Chapaux, 1894, pp. 482, 492; Dewèvre, 1894, p. 31). However, African preference for *Cannabis* drug uses made economic botanical sense: a small patch could supply abundant smokeable material but scant fibre; many other wild and farmed plants supplied fibre; and high-quality hemp was labour intensive.

Second, control laws considered *Cannabis*' indigenous psychoactive uses valueless, despite legal markets. Mozambique's initial law ended without mention a formal export trade to Transvaal; all colonies outlawed active internal markets. In most locations, *Cannabis* remained legal if grown with government authorization to supply pharmaceutical *Cannabis*, a Western drug. Indeed, colonial authorities accepted drug crops, but only those specified through their absence in drug-control laws and presence in agricultural policies – particularly tobacco, tea and

Table 1. *Cannabis*-control laws in Africa enacted prior to implementation of the 1925 International Opium Convention.

Colony	Year	Law	Stated purposes	Prohibited behaviours
British Natal	1870	Law No. 2, 1870, to Amend and Consolidate the Laws relating to the Introduction of Coolie Immigrants into this Colony […]	Control behaviour and health of Indian labourers	Farming, possession and use of *Cannabis* by Indian labourers; sale/gift of *Cannabis* to Indian labourers
Khedivate of Egypt	1879	[unknown law, cited in Indian Hemp Drugs Commission, 1894, p. 270]	Control public health and behaviour; strengthen earlier law (1868)	Farming, import and use of *Cannabis*
German East Africa	1891	Verordaung des kaiserlichen Gouverneurs vom 2 September 1891	Control native health, and behaviour of colonial troops	Farming, sale and use of *Cannabis*
French Madagascar	1901	Arrêté du gouverneur général du 3 décembre 1901	Control native behaviours	Sale and use of *Cannabis*
Congo Free State	1903	Décret du 1er mars 1903	Control native health; preserve labour quality; prevent crime	Farming, sale and use of *Cannabis*
Orange Free State	1903	Ordinance 48	Control native health; prevent crime	Farming, sale, and use of *Cannabis*
Anglo-Egyptian Sudan	1907	Hashish Ordinance 1907	Prevent use of *Cannabis* drugs; control access to pharmaceuticals; clarify and strengthen earlier law (1901)	Farming, manufacture, sale, possession, import, export and transport of *Cannabis*, without authorization; use of *Cannabis* pharmaceutical preparations without authorization
French Congo	1909	Circulaire au sujet des mesures à prendre contre l'usage et la diffusion du chanvre	Control native health; preserve labour quality; prevent crime	Farming, sale and use of *Cannabis*
Portuguese São Tome e Principe	1911	Decreto […] proibe a cultura, venda e importação de cânhamo indiano	Control health of labourers	Farming, import, sale and use of *Cannabis*
German South-west Africa	1912	Verordaung des kaiserlichen Gouverneurs vom 25 Mai 1912	Control native health; control behaviour of colonial troops	Farming, sale and use of *Cannabis*
British Nyassaland	1912	Sale of Drugs and Poisons Ordinance, 1912	Control native health	Sale of *Cannabis* without authorization
Portuguese Angola	1913	Portaria provincial proibindo […] o fornecimento a indigenas da *riamba*, ou *liamba*, por ter efeitos perniciosos semelhantes aos do ópio	Control native health; control behaviour of colonial troops; encourage tobacco farming	Farming *Cannabis* without authorization; sale/giving drug *Cannabis* to 'natives'

(*Continued*)

Table 1. Continued.

Colony	Year	Law	Stated purposes	Prohibited behaviours
British East Africa	1913	Abuse of Opiates Prevention Ordinance, 1913	Control access to pharmaceuticals; control native health	Use of *Cannabis* except pharmaceutical preparations; pharmaceutical use without authorization
British East Africa	1914	Government Notice 100	Control native health	Farming and sale of *Cannabis* without authorization
Portuguese Moçambique	1914	Portaria provincial proibindo […] a importação, cultura, venda e consumo da planta conhecida cafrealmente por bangue ou suruma	Control native health	Farming, import, sale and use of *Cannabis*
French West Africa, French Equatorial Africa	1916	Decrèt du 30 décembre 1916	Prevent use of harmful drugs; control access to pharmaceuticals; apply metropolitan law to colonies	Import, sale, possession and use of *Cannabis*
Union of South Africa	1922	No. 35: Customs and Excise Duties Amendment Act [cited in Chanock, 2001, p. 94]	Control native health; prevent crime; preserve labour quality	Farming, sale, possession and use of *Cannabis*
British Mauritius	1923	Ordinance No. 8	Control native health; control access to pharmaceuticals	Farming, import, sale and possession of *Cannabis*; pharmaceutical use without authorization
French Equatorial Africa	1926	Interdiction de la culture du chanvre et répression de son emploi comme stupéfiant en Afrique équatoriale française	Control native health; preserve labour quality; prevent crime; clarify earlier laws (1916 [above] and 1918)	Farming, sale, possession and use of *Cannabis*

Note: Two errors exist in recent accounts of African colonial *Cannabis* laws: (1) several colonies enacted laws prohibiting opium, cocaine, "and similar drugs" in 1913, to comply with the 1912 Opium Convention (see *Journal of the Society of Comparative Legislation*, vol. 15 [1915]). *Cannabis* was not listed in these laws. (2) British Cape Colony's Medical and Pharmacy Act of 1891 does not list *Cannabis*.

coffee. Colonial agricultural institutions actively supported these crops; *Cannabis* has been completely excluded from African agricultural research and development.

Third, African *Cannabis* was devalued as merely an introduced plant that Africans had passively accepted without any agricultural agency. By the 1850s, biogeographers recognized that *Cannabis* had been anciently introduced to Africa, and not from Europe (de Candolle, 1855, p. 833). Three centuries of botanical literature had established psychoactive *C. indica* as an Oriental object, "Indian hemp" rather than non-psychoactive, European hemp (*C. sativa*). African *Cannabis* signified Oriental influence, a counterpoint to the civilizing influence of European colonialism. "The tobacco introduced by the Portuguese has contended successfully against the stupefying or maddening hemp […] from the far Muhammadan north-east", celebrated a British administrator in Belgian Congo (Johnston, 1908, p. 78). Africans were simply recipients, having no role in facilitating crop dispersal through farming, or in resisting *Cannabis*' "gradual but sure advances" into new lands (Du Chaillu, 1861, p. 420).

By extension, African agriculture was devalued through the belief that the introduced crop had only degenerated under African farmers. Europeans considered African *Cannabis* a second-rate version of the global drug crop. For instance, in East Africa about 1860, the local *Cannabis* was "a fine large species […] grow[n] before every cottage door" according to a British traveller with experience in India. Nonetheless, he compared the East African crop to South Asian "jungle bhang", or feral *Cannabis* (Burton, 1860, p. 81). Similarly, French colonial law described "Indian hemp" – drug *Cannabis* grown in India – as "particularly rich in [psychoactive] resin". In contrast, "Congo hemp" had a "lesser quantity of [psycho]active principles", even though, paradoxically, it was used "to make preparations quite like [those of Indian hemp], with similar effects" (Ministère des Colonies, 1926).

Colonial *Cannabis* controls in Africa were strict in global terms. Indeed, *Cannabis*' listing in the 1925 Opium Convention began with the request of South Africa's white minority government supported by newly independent Egypt (Mills, 2003), whose authorities had since the 1860s legally suppressed *Cannabis* in order to control labourers (Kozma, 2011). The 1925 agreement established a regulatory approach to drug control; the United Nations' 1961 Single Convention on Narcotic Drugs (SCND) shifted international policy to strict legal prohibition, modelled on U.S. policies (Bewley-Taylor et al., 2014). In much of Africa, however, strict controls had been in place for decades and were unchanged after independence, to maintain compliance with international agreements. Of the African states party to the United Nations, only Somalia and Ethiopia opposed the SCND during its negotiation (Sinha, 2001, pp. 19–20). Other colonial and independent states remained neutral, thereby disclaiming indigenous traditions of *Cannabis* use, in contrast to South Asian countries that sought to protect longstanding practices. In the 1960s and 1970s, *Cannabis* became concerning to authorities in Africa and worldwide as it increasingly symbolized resistance to authority (Ellis, 2009; Klantschnig, 2014; Paterson, 2009). Ultimately, all African states except Equatorial Guinea, Somalia and South Sudan have signed key United Nations conventions from 1971 and 1988 that firmly marked *Cannabis* as an illegal crop.

Re-thinking African *Cannabis*

Drug-policy reform is unfolding worldwide because some civil societies and governments have concluded that criminalizing drug use creates more harms than benefits. *Cannabis* policy reform has been pursued primarily in North America and Europe, where several jurisdictions have decriminalized certain instances of cultivation, sales, possession and use. In the Global South, only Uruguay has formally stepped in the same direction, enacting decriminalization in 2013. Court decisions in Brazil and Mexico in late 2015, and ongoing legislative debates in Morocco,

Rwanda and South Africa suggest these countries may follow. There are seemingly no other significant, open movements towards decriminalization in Africa.

Possible effects of drug-policy reform on agricultural development in the Global South have received little attention. Participation in illegal *Cannabis* farming entails numerous and complex causes and consequences (Blackwell, 2014; Chouvy & Laniel, 2007; Zurayk, 2013). Implications of *Cannabis* policy reform on agriculture are similarly multifaceted, but three are noteworthy with regard to *Cannabis*' African agricultural past.

First, colonial *Cannabis* prohibitions were exogenous, even if indigenous societies had varying opinions about the drug, and norms that limited its use. Central Africans resisted *Cannabis* prohibitions when they were first enacted (Berriedale Keith, 1919, p. 195; Hunt, 1999, p. 56; Likaka, 2009, p. 46; Reeve, 1921, p. 180). Continued farming and use there and elsewhere arguably constitutes continued resistance (Zurayk, 2013). Despite longstanding prohibitions, African *Cannabis* cultures and agricultures persist. Farmers adopted *Cannabis* long ago because it provided products distinct from those of existing crops and wild plants; these products were valued for household consumption and/or income generation. *Cannabis* widely maintains this role in African agricultural systems, even though farmers cannot legally grow, use or sell it. Drug-policy reform could allow African societies to re-examine the definitions of agriculture implicit in drug-control laws.

Second, African *Cannabis* is undervalued in terms of global agricultural heritage. *Cannabis* experienced secondary diversification in Africa because farmers selected the crop to meet their agricultural needs and local demand for plant products. Although there is scant research-based evidence about *Cannabis* landrace diversity in Africa (Clarke & Merlin, 2013, p. 330), the world's *de facto* experts on *indica* diversity – commercial bioprospectors – consider the continental crop highly significant.

Commercial bioprospectors are the world's experts because mainstream agricultural institutions ignore African *Cannabis* specifically and *indica* more generally. For instance, Biodiversity International, part of the Consultative Group for International Agricultural Research, works to "deliver scientific evidence, management practices and policy options" to conserve underutilized crops, under the vision that "agricultural biodiversity matters" (Biodiversity International, 2014). The organization, however, has considered only European *C. sativa* used for hemp (Pavelek & Lipman, 2010). Yet, *C. sativa* is reasonably represented in *ex situ* seed banks (see Hillig, 2004, 2005b), while African drug strains are essentially absent except in private, commercial collections held by seed sellers or pharmaceutical companies. Scholarly research on *indica* genetic diversity relies heavily on these collections (e.g. Hillig, 2005a Sawler et al., 2015). Private control of germplasm is exactly what critics of seed-improvement initiatives like AGRA oppose with regard to food crops (Thompson, 2012).

The germplasm collections of commercial marijuana seed companies and pharmaceutical firms are important for conserving crop genetic diversity. However, these companies make no clear efforts to preserve IPRs potentially embedded in landraces, and seemingly make their products available only through sales; only the seed companies sell germplasm. Jamaica is the sole country to claim a *Cannabis* strain as intellectual property (Cadogan, 2015). If *Cannabis* IPRs exist in Jamaica, they exist elsewhere: the plant arrived in Jamaica not before the 1840s, carried by Central African and South Asian labourers whose forebears had cultivated the crop for centuries (Duvall, 2015, pp. 102–104). Debates over private versus public control of germplasm are unresolved, centring on whether property rights can or should be embedded in life forms. Regardless the outcome of these debates, private, commercial control is the default for *C. indica* because public institutions, whether governments or organizations like Biodiversity International, exclude the crop as an extension of drug policy. Societies should assess how *Cannabis* genetic diversity is managed as an aspect of drug-policy reform.

Finally, the African *Cannabis* crop earns less than its potential value in terms of monetary worth. The decriminalization of *Cannabis* in North American and European jurisdictions has opened lucrative markets. However, non-tariff trade barriers (that is, drug trafficking laws) hinder Global Southern producers from participating in these markets, despite the comparative advantages Southern producers have through low-input outdoor production and lower labour costs. Import substitution in the Global North (via indoor horticulture) is simultaneously foreclosing potential export markets for Southerners and generating wealth for Northerners (Bouchard et al., 2011; Zurayk, 2013). Further, countries in the Global South continue to expend resources on *Cannabis* control even as Northern countries have loosened controls in apparent violation of multilateral drug-control agreements (International Narcotics Control Board, 2015).

For *Cannabis*, drug policy implies agricultural policy. This relationship is recognized in the drug-control strategy of alternative development, which centres on providing incentives for farmers to switch to legal crops (UNODC, 2015). Alternative development has been hardly pursued in Africa. The only alternative development intervention, in Morocco, failed because European demand for hashish remained strong and provided a reliable market for farmers with few other options (Chouvy, 2008). Proponents of alternative development have not enunciated any relationship between alternative development and the globally shifting legality of *Cannabis* (e.g. UNODC, 2015). Agricultural development efforts similarly neglect to enunciate how drug policy might impact farming.

A truly alternative development strategy would be to decriminalize *Cannabis* production in a way that allows Global Southern farmers to access lucrative markets, whether domestic or international (Buxton, 2015; Laudati, 2014). Of course, open *Cannabis* markets would favour well-capitalized farmers, probably not those who currently grow (Kepe, 2003; Zurayk, 2013). Still, decriminalizing production would increase the legal crop choices farmers have for generating income.

In any case, past African farmers produced globally significant *Cannabis* crop diversity, and current farmers capture little of the crop's global value.

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References

African Center for Biodiversity. (2013). *Giving with one hand and taking with two: A critique of AGRA's African Agriculture Status Report 2013*. Melville: ACB.

Akyeampong, E. (2005). Diaspora and drug trafficking in West Africa: A case study of Ghana. *African Affairs*, *104*(416), 429–447.

Alliance for a Green Revolution in Africa. (2015). *Progress report 2007–2014*. Nairobi: AGRA.

Backes, M. (2014). *Cannabis pharmacy: The practical guide to medical Marijuana*. New York, NY: Black Dog & Leventhal.

van Bakel, H., Stout, J. M., Cote, A. G., Tallon, C. M., Sharpe, A. G., Hughes, T. R., & Page, J. E. (2011). The draft genome and transcriptome of *Cannabis sativa*. *Genome Biology*, *12*(10), article R102.

Barroso da Silva, F. M. (1799/1864). Descripção de algumas drogas e medicamentos da India [Description of some Indian spices and medicines]. *Archivo de Pharmacia e Sciencias Accessorias da India Portugueza*, *1*(12), 185–191.
Baum, H. (1903). *Kunene-Sambesi-expedition*. Berlin: Kolonial-Wirtschaftlichen Komitees.
Berriedale Keith, A. (1919). *The Belgian Congo and the Berlin act*. Oxford: Clarendon.
Bewley-Taylor, D., Blickman, T., & Jelsma, M. (2014). *The rise and decline of Cannabis prohibition*. Amsterdam: Transnational Institute.
Biodiversity International. (2014). Who we are [website]. *Biodiversity International*. Retrieved December 29, 2015, from http://www.bioversityinternational.org/about-us/who-we-are/
Blackwell, J. M. (2014). The costs and consequences of U.S. drug prohibition for the peoples of developing nations. *Indiana International and Comparative Law Review*, *24*(3), 665–692.
Bloomer, J. (2008). Using a political ecology framework to examine extra-legal livelihood strategies: A Lesotho-based case study of cultivation of and trade in cannabis. *Journal of Political Ecology*, *16*, 49–69.
Bøäs, M. (2014). North Kivu, Eastern Congo: Buffer, battleground, sanctuary. In B. Vassort-Rousset (Ed.), *Building sustainable couples in international relations: A strategy towards peaceful cooperation* (pp. 146–164). New York, NY: Palgrave Macmillan.
Bouchard, M., Potter, G., & Decorte, T. (Eds.). (2011). *World wide weed: Global trends in Cannabis cultivation and its control*. Farnham: Ashgate.
Bourhill, C. J. G. (1913). The smoking of dagga (Indian hemp) among the native races of South Africa and the resultant evils (*Unpublished doctoral dissertation*). University of Edinburgh, Edinburgh.
Breen, B. (2004). Dr. Dope's connection [website]. *Fast Company.* Retrieved December 29, 2015, from http://www.fastcompany.com/48172/dr-dopes-connection
Burney, D. A. (1987). Pre-settlement vegetation changes at Lake Tritrivakely, Madagascar. *Paleoecology of Africa*, *18*, 357–381.
Burton, R. F. (1860). *The lake regions of central Africa*. New York, NY: Harper & Brothers.
Burton, R. F. (1876). *Two trips to Gorilla land and the Cataracts of the Congo* (Vol. 2). London: Sampson Low.
Büttikofer, J. (1890). *Reisebilder aus Liberia* [Travel Pictures from Liberia] (Vol. 2). Leiden: Brill.
Buxton, J. (2015). *Drugs and development: The great disconnect*. Singleton Park: Global Drug Policy Observatory.
Cadogan, M. (2015). The legal implications of medical marijuana as a geographical imdication for Jamaica [website]. *Intellectual Property Watch*. Retrieved December 29, 2015, from http://www.ip-watch.org/2015/03/02/the-legal-implications-of-medicinal-marijuana-as-a-geographical-indication-for-jamaica/
de Candolle, A. (1855). *Géographie botanique raisonnée* (Vol. 2). Paris: Masson.
Carney, J. A., & Rosomoff, R. N. (2009). *In the shadow of slavery: Africa's botanical legacy in the Atlantic world*. Berkeley: University of California Press.
Cervantes, J. (2002). World's greatest seed banks [website]. *High Times*. Retrieved December 29, 2015, from http://hightimes.com/read/worlds-greatest-seed-banks
Chanock, M. (2001). *Making of South African legal culture, 1902-1936: Fear, favour, and prejudice*. Cambridge: Cambridge University Press.
Chapaux, A. (1894). *Le Congo* [The Congo]. Brussels: Charles Rozez.
Chevalier, A. (1944). Histoire de deux plantes cultivées d'importance primordiale: Le Lin et le Chanvre [History of two cultivated plants of primordial importance: Flax and hemp]. *Revue de Botanique Appliquée et d'Agriculture Coloniale*, *24*, 51–71.
Chouvy, P.-A. (2008). Production de cannabis et de haschich au Maroc [Production of cannabis and hashish in Morocco]. *L'Espace Politique*, *4*(1), Article 59.
Chouvy, P.-A., & Laniel, L. (2007). Agricultural drug economies: Cause or alternative to intra-state conflicts? *Crime, Law and Social Change*, *48*, 133–150.
Clarke, R. C., & Merlin, M. D. (2013). *Cannabis: Evolution and ethnobotany.* Berkeley: University of California Press.
Clarke, R. O. (1851). Short notice of the African plant Diamba, commonly called Congo Tobacco. *Hooker's Journal of Botany*, *3*, 9–11.
Daniell, W. F. (1850). On the D'amba, or dakka, of southern Africa. *Pharmaceutical Journal and Transactions*, *9*(8), 363–365.
Datwyler, S. L., & Weiblen, G. D. (2006). Genetic variation in hemp and marijuana according to amplified fragment length polymorphisms. *Journal of Forensic Sciences*, *51*(2), 371–375.
de Ficalho, C. (1884/1947). *Plantas úteis da África portuguesa* [Useful plants of Portuguese Africa]. Lisbon: Agéncia Geral das Colónias.

Decazes, M. (1888). L'ouest africain. Relation de voyage [West Africa. Travel narrative]. *Société Normande de Géographie, Bulletin de l'Année*, *10*, 37–63.
Dewèvre, A. (1894). *Les plants utiles du Congo* [Useful plants of the Congo]. Brussels: Jules Vanderauwera.
Dias de Carvalho, H. A. (1892). *Expedição Portugueza ao Muatiânvua: Descripção da Viagem á Mussumba do Muatiânvua* [Portuguese expedition to the Muatiânvua: Description of the Voyage to Mussumba from the Muatiânvua] (Vol. 2). Lisbon: Imprensa Nacional.
Doke, C. M. (1931). *The Lambas of Northen Rhodesia*. London: George Harrap.
dos Santos, J. (1609). *Ethiopia oriental e varia historia de covsas* [Eastern Ethiopia and Ranging History of Things]. Evora: Conuento de S. Domingos.
Du Chaillu, P. B. (1861). *Explorations and adventures in equatorial Africa* (1st ed.). New York, NY: Harper Brothers.
du Gast, C. (1908). *Le Maroc agricole* [Agricultural Morocco]. Paris: Imprimerie Nationale.
du Toit, B. M. (1980). *Cannabis in Africa*. Rotterdam: Balkema.
Dukerley, I. (1866). Note sur les différences que présente avec le chanvre ordinaire et la variété de cette espèce connue en Algérie sous les noms de *kif* et de *tekrouri* [Note on the differences between ordinary hemp and the variety of this species known in Algeria under the names kif and *tekrouri*]. *Bulletin de la Société Botanique de France*, *3*, 401–406.
Dutfield, G. (2004). *Intellectual property, biogenetic resources, and traditional knowledge*. London: Earthscan.
Duvall, C. S. (2015). *Cannabis*. London: Reaktion Books.
Ellis, S. (2009). West Africa's international drug trade. *African Affairs*, *108*(431), 171–196.
Foreign Office and Board of Trade (Ed.). (1912). *Report for the year 1911 on the trade and commerce of the Portuguese Possessions in East Africa* (No. 4881 Annual Series). London: His Majesty's Stationery Office.
Foreign Office and Board of Trade (Ed.). (1916). *Report for the year 1914 on the trade and commerce of Lourenço Marques and other Portuguese Possessions in East Africa* (No. 5558 Annual Series). London: His Majesty's Stationery Office.
Foureau, F. (1903). *Documents scientifiques de la Mission Saharienne* [Scientific documents from the Saharan mission] (Vol. 1). Paris: Masson.
Giraud, V. (1890). *Les lacs d'Afrique équatoriale* [The lakes of equatorial Africa]. Paris: Hachette.
Godard, L. (1860). *Description et histoire du Maroc* [Description and history of Morocco]. Paris: Tanera.
Gordon, D. (1996). From rituals of rapture to dependence: The political economy of Khoikhoi narcotic consumption. *South African Historical Journal*, *35*, 62–88.
Higginson, J. (1990). *A working class in the making: Belgian colonial labor policy, private enterprise, and the African mineworker*. Madison: University of Wisconsin Press.
Hillig, K. W. (2004). A multivariate analysis of allozyme variation in 93 *Cannabis* accessions from the VIR germplasm collection. *Journal of Industrial Hemp*, *9*(2), 5–22.
Hillig, K. W. (2005a). Genetic evidence for speciation in *Cannabis* (Cannabaceae). *Genetic Resources and Crop Evolution*, *52*, 161–180.
Hillig, K. W. (2005b). A combined analysis of agronomic traits and allozyme allele frequencies for 69 *Cannabis* accessions. *Journal of Industrial Hemp*, *10*(1), 17–30.
Hillig, K. W., & Mahlberg, P. G. (2004). A chemotaxonomic analysis of cannabinoid variation in *Cannabis* (Cannabaceae). *American Journal of Botany*, *91*(6), 966–975.
Hunt, N. R. (1999). *A colonial Lexicon: Of birth ritual, medicalization, and mobility in the Congo*. Durham: Duke University Press.
Indian Hemp Drugs Commission. (1894). *Report of the Indian Hemp Drugs Commission*. Simla: Government Printing Office.
Institute of Development Studies. (2011). Special issue: The politics of seed in Africa's Green Revolution. *IDS Bulletin*, *42*(4), 1–120.
International Cannagraphic. (2015). Forum: Landraces [website]. *International Cannagraphic*. Retrieved December 29, 2015, from https://www.icmag.com/ic/forumdisplay.php?f=65686.
International Narcotics Control Board. (2015). *Report of the International Narcotics Control Board for 2014*. New York, NY: United Nations.
Ivens, C. (1898). L'Angola méridional [Southern Angola]. *Société d'Études Coloniales*, *5*(5), 233–269.
Jarosz, L. (2012). Growing inequality: Agricultural revolutions and the political ecology of rural development. *International Journal of Agricultural Sustainability*, *10*(2), 192–199.
Johnston, H. (1908). *George Grenfell and the Congo: A history and description of the Congo independent state* (Vol. 1). London: Hutchinson.

Kepe, T. (2003). *Cannabis sativa* and rural livelihoods in South Africa: Politics of cultivation, trade and value in Pondoland. *Development Southern Africa*, *20*(5), 605–615.
Kingsley, M. H. (1897). *Travels in West Africa*. London: Macmillan.
Klantschnig, G. (2014). Histories of cannabis use and control in Nigeria, 1927–1967. In G. Klantschnig, N. Carrier, & C. Ambler (Eds.), *Drugs in Africa: Histories and ethnographies of use* (pp. 69–88). Gordonsville: Palgrave Macmillan.
Kloppenburg, J. (2005). *First the seed: The political economy of plant biotechnology* (2nd ed.). Madison: University of Wisconsin Press.
Kolben, P. (1713/1748). Histoire naturelle du Cap de Bonne-Esperance & des Pays voisins [Natural history of the Cape of Good Hope and the neighboring countries]. In L. A. Prevost (Ed.), *Histoire générale des voyages*, Vol. 6 (pp. 505–533). The Hague: Pierre de Hondt.
Kozma, L. (2011). Cannabis prohibition in Egypt, 1880–1939: From local ban to league of nations diplomacy. *Middle Eastern Studies*, *47*(3), 443–460.
Laudati, A. A. (2014). Out of the shadows: Negotiations and networks in the cannabis trade in eastern democratic republic of Congo. In G. Klantschnig, N. Carrier, & C. Ambler (Eds.), *Drugs in Africa: Histories and ethnographies of use* (pp. 161–181). Gordonsville: Palgrave Macmillan.
Likaka, O. (2009). *Naming colonialism: History and collective memory in the Congo*. Madison: University of Wisconsin Press.
Mbilinyi, M. (2012). Struggles over land and livelihoods in African agriculture. *Development*, *55*, 390–392.
de Meijer, E. P. M. (2014). The chemical phenotypes (chemotypes) of *Cannabis*. In R. Pertwee (Ed.), *Handbook of Cannabis* (pp. 89–110). Oxford: Oxford University Press.
Mills, J. H. (2003). *Cannabis Britannica: Empire, trade, and prohibition*. Oxford: Oxford University Press.
Ministério das Colónias. (1918). *Colecção da Legislação Colonial da República Portuguesa* [Collection of colonial legislation of the Portuguese republic]. *1913* (Vol. 4). Lisbon: Imprensa Nacional.
Ministère des Colonies. (1926). Interdiction de la culture du chanvre et répression de son emploi comme stupéfiant en Afrique équatoriale française [Prohibition of hemp cultivation and repression of its employment as a narcotic in French Equatorial Africa]. *Journal Officiel de la République Française*, *58*(207), 10017.
Muller, S. D., Rhazi, L., Andrieux, B., Bottollier-Curtet, M., Fauquette, S., Saber, E.-R., … Daoud-Bouattour, A. (2015). Vegetation history of the western Rif mountains (NW Morocco): Origin, late-Holocene dynamics and human impact. *Vegetation History and Archaeobotany*, *24*(4), 487–501.
Offen, K. (2004). Historical political ecology: An introduction. *Historical Geography*, *32*, 19–42.
Paterson, C. (2009). *Prohibition and resistance: A socio-political exploration of the changing dynamics of the Southern African Cannabis trade* (*Unpublished thesis*). Rhodes University, Johannesburg.
Pavelek, M., & Lipman, E. (2010). *Report of a working group on Fibre Crops (Flax and Hemp)*. Velké Losiny: Biodiversity International.
Payeur-Didelot, J. F. (1898). Colonisation, commerce, industrie et agriculture au Congo [Colonization, commerce, industry and agriculture in the Congo]. *Bulletin de la Société de Géographie de l'Est*, *20*, 17–43.
Peltzer, K., Ramlagan, S., Johnson, B. D., & Phaswana-Mafuya, N. (2010). Illicit drug use and treatment in South Africa. *Substance Use & Misuse*, *45*(13), 2221–2243.
Perez, P., & Laniel, L. (2004). Croissance et … croissance de l'économie du cannabis en Afrique subsaharienne [Growth and … growth of the cannabis economy in sub-Saharan Africa]. *Hérodote*, *112*(1), 122–138.
Philips, J. E. (1983). African smoking and pipes. *The Journal of African History*, *24*(3), 303–319.
Pingali, P. L. (2012). Green revolution: Impacts, limits, and the path ahead. *Proceedings of the National Academy of Sciences*, *109*(31), 12302–12308.
Redinha, J. (1946). *Relatorio Annual 1945* [Annual report 1945]. Dundo: Companhia de Diamantes de Angola.
Reeve, T. E. (1921). *In Wembo Nyama's Land*. Nashville: Methodist Episcopal Church.
René-Leclerc, C. (1905). Le commerce et l'industrie à Fez [Commerce and industry at Fez]. *Bulletin du Comité de l'Afrique Française*, *4* (Supplement), 229–350.
Rosenthal, F. (1971). *The herb: Hashish versus medieval Muslim society.* Leiden: Brill.
Rucina, S. M., Muiruri, V. M., Downton, L., & Marchant, R. (2010). Late-Holocene savanna dynamics in the Amboseli Basin, Kenya. *The Holocene*, *20*(5), 667–677.
Sawler, J., Stout, J. M., Gardner, K. M., Hudson, D., Vidmar, J., Butler, L., … Myles, S. (2015). The genetic structure of marijuana and hemp. *PLoS ONE*, *10*(8), e0133292.
Say, L., & Chailley, J. (1892). *Nouveau dictionnaire d'économie politique* (Vol. 2). Paris: Guillaumin.

Scoones, I., & Thompson, J. (2011). The politics of seed in Africa's green revolution: Alternative narratives and competing pathways. *IDS Bulletin*, *42*(4), 1–23.
Seedfinder.eu. (n.d.). Breeder & seedbanks [website]. *Seedfinder.eu*. Retrieved December 29, 2015, from http://en.seedfinder.eu/database/breeder/
Seeds of Africa. (2013). About SOA seedbank [website]. *Seeds of Africa*. Retrieved December 29, 2015, from http://www.seeds-of-africa.com/about-soa-seedbank/
Seguin, C. (1910). Les hallucinations d'un fumeur de chanvre au Gabon [The hallucinations of a hemp smoker in Gabon]. *Journal des Voyages*, *704*, 427.
Seshata. (2013). Cannabis in Malawi. *Sensi Seeds*. Retrieved December 29, 2015, from http://sensiseeds.com/en/blog/cannabis-in-malawi/
Silva Porto, A. (1885/1942). *Viagens e Apontamentos de um Portuense em África* [Travel and notes of an Oporto Native in Africa]. Lisbon: Agência Geral das Colónias.
Sinha, J. (2001). *The history and development of the leading international drug control conventions*. Ottawa: Library of Parliament.
Small, E. (2015). Evolution and classification of *Cannabis sativa* in relation to human utilization. *The Botanical Review*, *81*, 189–294.
Small, E., & Cronquist, A. (1976). A practical and natural taxonomy for *Cannabis*. *Taxon*, *25*(4), 405–435.
Smith, S., Bubeck, D., Nelson, B., Stanek, J., & Gerke, J. (2015). Genetic diversity and modern plant breeding. In M. R. Ahuja & S. M. Jain (Eds.), *Genetic diversity and erosion in plants* (pp. 55–88). Geneva: Springer International.
Söllner, C. (1897). *Un voyage au Congo* [A voyage to the Congo] (2nd ed.). Namur: Auguste Godenne.
Strain Hunters. (2010a). Morocco expedition. *Strain Hunters*. Retrieved December 29, 2015, from http://forums.strainhunters.com/site/index.php/index.html/_/expeditions/africa-expedition-malawi-r5
Strain Hunters. (2010b). Africa expedition – Malawi. *Strain Hunters*. Retrieved from http://forums.strainhunters.com/site/index.php/index.html/_/expeditions/morocco-expedition-r2
Strain Hunters. (2013). Landraces. *Strain Hunters*. Retrieved December 29, 2015, from http://forums.strainhunters.com/site/index.php/index.html/_/articles/landraces/
Strain Hunters/YouTube. (n.d.). Strain Hunters channel. *YouTube*. Retrieved December 29, 2015, from https://www.youtube.com/user/strainhunters
Thompson, C. B. (2012). Alliance for a green revolution in Africa (AGRA): Advancing the theft of African genetic wealth. *Review of African Political Economy*, *39*(132), 345–350.
Toenniessen, G., Adesina, A., & DeVries, J. (2008). Building an alliance for a green revolution in Africa. *Annals of the New York Academy of Sciences*, *1136*, 233–242.
Trivier, M. (1887). D'Ambriz au Gabon [From Ambriz to Gabon]. *Bulletin de la Société de Géographie de Rochefort*, *8*, 203–211.
United Nations Office on Drugs and Crime. (2015). *World drug report 2015*. New York, NY: United Nations.
Van der Merwe, N. J. (2005). Antiquity of the smoking habit in Africa. *Transactions of the Royal Society of South Africa*, *60*(2), 147–150.
Warf, B. (2014). High points: An historical geography of cannabis. *Geographical Review*, *104*(4), 414–438.
Welwitsch, F. (1862). *Synopse explicativa das amostras de madeiras e drogas medicinaes e de otros objectivos mormente ethnographicos colligidos na provincia de Angola* [Explanatory synopsis of wood and medicinal drug samples and other especially ethnographic objects collected in the province of Angola]. Lisbon: Imprensa Nacional.
Williams, C. M., Whalley, B. J., & McCabe, C. (2015). Cannabinoids and appetite (dys)regulation. In L. Fattore (Ed.), *Cannabinoids in neurologic and mental disease* (pp. 315–339). London: Academic Press.
Yapa, L. (1996). Improved seeds and constructed scarcity. In R. Peet & M. J. Watts (Eds.), *Liberation ecologies: Environment, development, and social movements* (pp. 69–85). New York, NY: Routledge.
Zinberg, N. E. (1986). *Drug, set, and setting: The basis for controlled intoxicant use*. New Haven: Yale University Press.
Zurayk, R. (2013). Should farmers just say no? *Journal of Agriculture, Food Systems, and Community Development*, *4*(1), 11–14.