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Research Paper

Agricultural innovations in Morocco's cannabis industry

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ABSTRACT

Background: Cannabis cultivation in Morocco's mountainous Rif region is undergoing its most profound development since mass production of hashish began in the early 1980s. The adoption of high-yielding varieties of cannabis, modern agricultural practices, and modern hashish production techniques began in the mid–2000s and accelerated after the mid-2010s, with the result that more potent and varied cannabis derivatives are now being produced and that increased quantities of highly potent hashish are seized in Europe.

Methods: This research was initiated to answer a simple research question: how, and to what extent, is the illegal cannabis industry modernizing in Morocco, now that we know that it explains the THC increase in hashish seized in Europe? To answer this question in the context of a lack of literature and quantitative data, empirical fieldwork was undertaken in cannabis fields and hashish-producing farms in Morocco in July and October 2017. A mostly qualitative approach to data collection was employed through participatory rural appraisals (discussions, interviews, direct observations). As such, this work builds predominantly upon primary research.

Results: Fieldwork showed that, subsequent to very localized, experimental beginnings in the early 2000s, the progressive and varied adoption of agricultural innovations at the cultivation and production stages has spread throughout the Rif during the 2010s. Interviews and direct observations conducted in the field indicate that the ongoing adoption of modern farming techniques has enabled the production of high-quality hashish and potent modern extracts. The still ongoing modernization and professionalization of the Moroccan cannabis industry is a testimony of the country's leading position in global hashish production.

Conclusion: What the future holds for Moroccan cannabis growers is difficult to predict. How legalization processes manifest themselves in Moroccan and European policies, and how upcoming developments will affect the social, economic, political and ecological stability of the region, remains largely unknown. However, the spread of cannabis cultivation in the Rif is clearly pushing economic and environmental limits, and there is an obvious need for innovations that mitigate such pressures.

Introduction

Cannabis cultivation in the northern Rif region of Morocco is currently undergoing its most significant evolution since the hashish industry emerged in the 1960s and dramatically developed in the 1980s (Chouvy & Afsahi, 2014; Clarke, 1998). By the 1990s, the country had reportedly overtaken Afghanistan as the world's largest hashish producer (UNODC, 2003). Now, as shown by what was documented during our recent fieldwork there, Morocco's cannabis industry is transforming once more, following the introduction of feminized[1] seed varieties in the late 1990s, the subsequent development of greatly-improved cultivation methods, and the production of high-potency modern extracts in the 2010s. This article is the result of a research that was initiated to answer a simple question: how, and to what extent, is the illegal cannabis industry modernizing in Morocco, now that we know (Chouvy & Afsahi, 2014) that it explains the THC[2] increase in hashish seized in Europe? As a result, this article is the first to describe and explain in details how cannabis cultivation and hashish extraction techniques are being modernized in Morocco, something that is still largely ignored by officials, academics, and journalists.

Morocco's traditional *kif* landrace was reportedly supplanted in the early 1980s by low-water-use varieties from the Near East and is probably long gone (Bellakhdar, 2008: 230). These varieties would become the new Moroccan cultivar and are still called *kif* even though

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[1] Regular cannabis seeds produce approximately 50% male and 50% female plants. In order to maximize female plants (they produce much more psychoactive substances than male plants) cannabis seeds that generated 95%+ female plants were created in the late 1990s.

[2] Delta-9 THC, the cannabinoid responsible for most of the psychoactive effects of cannabis.

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they are grown almost exclusively to produce hashish (compressed cannabis resin[3]). However, this newer cultivar is now being gradually replaced by modern high yielding varieties (HYVs) with significantly higher resin yields and potency (Chouvy & Afsahi, 2014). This phenomenon began to emerge in the late 1990s and early 2000s, and has rapidly developed since. Significantly, the increased yield produced by the new varieties suggests that an alleged two-third decline in cannabis cultivation (between 2003 and 2013: UNODC, 2015: 5; UNODC, 2015: 57) may have been compensated for by increased yields (Chouvy & Afsahi, 2014).

As shown by this article, based on primary qualitative research conducted in the Rif in July and October 2017, the modernization and diversification of the Moroccan cannabis industry has accelerated in the last few years (since last fieldwork in 2013), with traditional cannabis agriculture being increasingly replaced by modern methods. Fieldwork indicates that the adoption of agricultural innovations varies in scope and pace according to geographic location, as two small areas (Oued Laou and Ketama) appear more prone to adopting HYVs only, while a larger area (around Bab Berred) clearly displays aggregate adoption of the entire modern agricultural package (HYVs, seedlings on nursery beds, specific land preparation, row planting, drip irrigation, mulching, improved harvesting technique).

Fieldwork also showed that the adoption of modern techniques is not limited to cannabis cultivation but that it extends to hashish production. While traditional production of sieved hashish remains prevalent in the Rif, modern production techniques are developing, giving rise to very high-quality sieved hashish and various modern "cannabis extracts" of higher purity, quality and potency. Yet, these modern production techniques have not yet been widely adopted in the Rif and are still far from reaching the aggregate level, as various components of the technological package can be and are adopted independently.

Localized experimental beginnings in the early 2000s, followed by a more rapid adoption of agricultural innovations around Bab Berred commencing in the early 2010s, show that the modernization and professionalization of the cannabis industry is well developed in Morocco, which confirms its world leading position in hashish production (Chouvy & Afsahi, 2014). The future of Moroccan cannabis growers is difficult to foresee at this stage, but repression and legalization processes will certainly influence both Moroccan and European policies, and coming developments will affect the social, economic, political and ecological stability of an already fragile Rif region.

About the methodology

This research was initiated to verify a hypothesis proposed to answer a specific research question: that the modernization of the cannabis industry could explain the puzzling increase in yield, quality, and potency of Moroccan hashish seized in Europe during the last decade (Chouvy & Afashi, 2014; Dujourdy & Besacier, 2017). The research process began in 2012 to better understand what had taken place in Morocco since the last cannabis survey by the United Nations (UNODC, 2005), but also to explain why later official Moroccan hashish production figures were thought to be underestimated (Chouvy & Afsahi, 2014). Considering the lack of statistical data and academic literature on the recent Moroccan cannabis industry, most of the facts presented hereinafter are issued from fieldwork conducted by the authors in July and October 2017, enriched by previous fieldwork (since 2004 by Afsahi and Chouvy). The lack of data and literature is partly due to the fact that cannabis cultivation is illegal in Morocco and is difficult to document. Illegality also implies, and as is the case with opium in Afghanistan, that hashish production is not "a subject (or a location) that lends itself to quantitative methods or visible research teams" (Pain, 2010: 203).

Fieldwork was therefore mostly qualitative in nature. It resorted to the composite approach methodology detailed by Barakat, Chard, Jacoby, and Lume (2002) on the basis of participatory rural appraisals (Chambers, 1994) conducted through direct observations and interviews in specific farms and by way of visual reconnaissance throughout most of the Rif (in July and October 2017). General but precise observations were made from the roads as cannabis fields cover entire valleys and hillsides of the Central Rif. Specific observations were made possible by visiting four cannabis farms where about ten cannabis growers and hashish producers were interviewed. As this research is concerned with the initial stage of an emerging phenomenon, a broad panel of respondents was not available and farms and farmers were selected according to their early adoption of modern techniques through contacts first initiated from Europe through intermediaries in the underground cannabis industry and by way of social media. All the respondents had a long experience of cannabis cultivation and hashish production. Other minor respondents supplied clarifying or confirmatory details. The rural appraisals involved informal discussions (including indirect questions), partially-structured interviews, and direct observations (both simple and participant observations, including during hashish and rosin production) with Moroccan and European cannabis growers and producers in both July and October 2017.

As such, this work builds upon primary research rather than upon secondary research and stays away from the rather speculative generalisations and broad theories that too often characterise studies of illegal agricultural drug production. This empirical research was of the inductive type and was meant to try "to account for particular phenomena or groups of phenomena", not to see "under what conditions, if any, such accounts might apply more generally", including in broad theoretical frameworks (Shapiro, 2005: 188–189). It is indeed difficult at this stage to compare Morocco with other major hashish producers, and generalization or theoretical developments would be clearly premature. As a consequence, this research is not theory-driven and is "not determined to arrive at any particular theoretical destination" (Shapiro, 2005: 188–189).

Specific research questions were organized according to categories and subcategories that included new cultivation trends, contexts and introduction dates of HYVs, origins and costs of HYV seeds, cultivation techniques of HYVs, the reasons behind choosing HYVs and various modern hashish and modern extracts production techniques. Research questions were later used as an analytical framework to determine what data was most significant. The data was then analyzed according to the above-mentioned categories and individual cases as the same questions were asked from different actors. The patterns of modernization revealed by observations and oral testimonies were eventually found to answer the research questions with great consistency (few if any atypical observations and responses in what is clearly a growing regional trend). The general, Rif-wide observation of cannabis cultivation was conducted during the growing season in July 2017 as part of a planned driving itinerary comparable to the one followed during previous fieldwork (summers of 2004, 2013, 2015), allowing visual observations and comparisons (especially: spread of HYVs, irrigation, row planting, and geographic extent of cultivation). Limited quantitative data (related to yields, densities, water use, costs, etc.) was gathered but it was nevertheless of great value, completely new, and conferred a mix-methods status to this research. Despite limits inherent to the topic and the area, this research allowed the collection and analysis of new and valuable data and provided convincing answers to our initial questions. As in previous works, precise village names are not divulged in this article, and human respondents are anonymized for their protection.

[3] Resin is the sticky coating that is most abundant on the female cannabis flowers and is produced in and exuded from the trichomes. Resin must be distinguished from resin powder that consists of the glandular trichomes removed from the plant by sieving and that is pressed to make sieved hashish, also called hashish resin (Clarke, 1998: 372–373, 370).