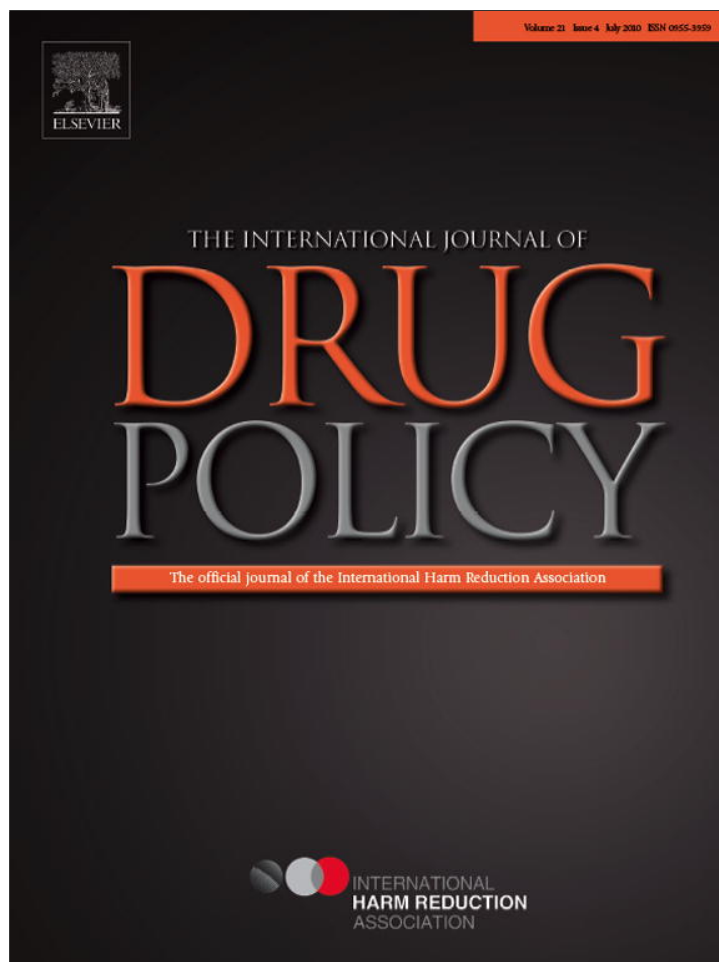


Provided for non-commercial research and education use.
Not for reproduction, distribution or commercial use.



This article appeared in a journal published by Elsevier. The attached copy is furnished to the author for internal non-commercial research and education use, including for instruction at the authors institution and sharing with colleagues.

Other uses, including reproduction and distribution, or selling or licensing copies, or posting to personal, institutional or third party websites are prohibited.

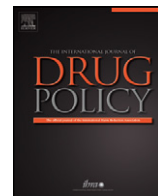
In most cases authors are permitted to post their version of the article (e.g. in Word or Tex form) to their personal website or institutional repository. Authors requiring further information regarding Elsevier's archiving and manuscript policies are encouraged to visit:

<http://www.elsevier.com/copyright>



Contents lists available at ScienceDirect

International Journal of Drug Policy

journal homepage: www.elsevier.com/locate/drugpo

Commentary

The case for small-scale domestic cannabis cultivation

Tom Decorte*

Institute for Social Drug Research, Ghent University, Universiteitstraat 4, B-9000 Gent, Belgium

ARTICLE INFO

Article history:

Received 26 January 2009

Received in revised form 19 January 2010

Accepted 19 January 2010

Keywords:

Cannabis

Cultivation

Amateur

Supply reduction

ABSTRACT

The shift to (inter)regional production, trade and domestic cultivation has become an irreversible international trend. Until now, the focus of most empirical work has been on large-scale, commercially oriented and professionally organized segments of the cannabis industry, often based on police data and on the perspective of law enforcement agencies.

This paper offers a review of recent *Dutch-language* research that focuses on cannabis cultivation. Empirical studies were identified through literature searches using relevant search terms and Web of Science, Elin, Social Science Research Network and Elsevier ScienceDirect.

The paper presents the main findings of Dutch and Belgian empirical work on the factors that stimulated the import substitution process on the cannabis market, aspects related to quality and potency issues, typologies of cannabis growers, and (unintended) effects of pursued policies. In the light of this (selective) review the author offers some commentary and analysis concerning the claims made by different stakeholders, and concludes with some reflections on future research and on policy implications. The author outlines the importance of small-scale, independent or ideologically oriented cannabis cultivation as an underresearched market segment. The author also makes a case for greater toleration of small-scale cannabis cultivation, to secure the least worst of cannabis markets.

© 2010 Elsevier B.V. All rights reserved.

Introduction: global cannabis markets

In most European countries, the use of cannabis has become widespread and publicly debatable. Over the last three decades major changes on the supply side have occurred: with the advent of new cultivation techniques and the cross-breeding of cannabis varieties, local cannabis cultivation has boomed, at the expense of bulk-imported foreign cannabis. The Netherlands emerged as an important incubation ground for this development, and until recently the country was considered the primary source of know-how of cannabis cultivation and one of the most important producers of (Dutch) marihuana (King, Carpentier, & Griffiths, 2004). Today the shift to (inter)regional production, trade and domestic cultivation has become an irreversible international trend (Szendrei, 1997; UNODC, 2006). Large shares of cannabis supplies are now produced domestically in the United States (Gettman, 2006; Reuter, Crawford, & Cave, 1988; Weisheit, 1992), Canada (Bouchard, 2007; Plecas, Dandurand, Chin, & Seger, 2002; Plecas, Malm, & Kinney, 2005), New Zealand (Wilkins & Casswell, 2003), The Netherlands (Jansen, 2002; Spapens, van de Bunt, & Rastovac, 2007; Wouters, Korf, & Kroeske, 2007) and the United Kingdom (Hough et al., 2003; Potter, 2006). A number of other European

countries, including Belgium, have been catching up with this trend (Asmussen, 2009; Decorte, 2007; Hakkarainen & Perälä, 2009).

These changes in the organisation of the cannabis market have raised an increased interest among drug researchers. Some authors have tried to estimate the size of the domestic cultivation industry, in terms of dollar turnover rates (Caulkins & Reuter, 1998; Rhodes, Layne, Johnston, & Hozik, 2000; Wilkins, Battha, & Casswell, 2002a) or in terms of number of plantations or people involved (Bouchard, 2007; Wouters et al., 2007). Others have looked at the opportunities for new and existing offenders to enter the illegal trade (Bouchard, Alain, & Nguyen, 2009). Experts suggest the substitution of the importation-driven industry with a production-driven industry is an adaptive strategy triggered by increases in risks of detection and arrest among importers (Chin, Dandurand, Plecas, & Segger, 2000; Reuter et al., 1988). Law enforcement pressure, especially large-scale eradication programs, may also have contributed to the trend from outdoor towards indoor cultivation (Gettman, 2006; Wilkins, Battha, & Casswell, 2002b). Furthermore, the rise of domestic cannabis cultivation is associated with heightened levels of criminal organisation (Hafley & Tewksbury, 1995; Spapens et al., 2007), involvement of 'gangs' (Plecas et al., 2002), and higher levels of violence (Walker, Cocklin, & Blunden, 1998).

Finally, indoor cultivation of cannabis is also associated with higher THC levels, as a reflection of genetic factors (selected seed varieties and cultivation of female plants), environmental factors (the sensimilla cultivation technique and seed production) and

* Tel.: +32 09 264 69 62.

E-mail address: tom.decorte@ugent.be.

freshness (local production sites are closer to the consumer and storage degradation of THC is avoided) (King et al., 2004). The health and psychological affects and risks of cannabis with high THC concentrations raise a lot of concerns among experts and in the public debate, but they are not well understood (Pijlman, Rigter, Hoek, Goldschmidt, & Niesink, 2005; Potter, Clark, & Brown, 2008).

Several authors have constructed typologies of cannabis cultivators (Bovenkerk & Hogewind, 2002; Hough et al., 2003; Weisheit, 1992), but the majority of empirical studies on cannabis cultivation relate to large-scale, commercially oriented growers, and are often based on police data. Both Weisheit (1990, 1991a, 1991b, 1992) in his study of arrested large-scale cannabis growers in Illinois (USA) and Hough et al. (2003), in their internet-based study of 37 cultivators in the UK, point at the intangible (social and intrinsic) rewards of growing cannabis, and not just the financial profits. Others have acknowledged the existence of 'ideologically oriented' dealers and growers, but they either argued these 'trading charities' and 'mutual societies' died out in the 1980s as they were replaced by more criminally orientated drug dealers (Dorn & South, 1990), or they claimed their market significance is minor in terms of the total amount of cannabis produced (Bouchard, 2007).

Empirical studies that focus on small-scale cultivators ('for personal use', the 'hobbyists') are rare. In a recent ethnographic study of domestic cannabis production in the UK, Potter (2006) argues that whether or not alternative, ideological dealing outfits did disappear completely, they are back now, at least in relation to the home-grown cannabis market.

Furthermore, the organisation of cannabis markets and the consequences may differ considerably around the world, and direct comparisons between data in Europe, North America and Oceania have questionable relevance. There are major differences in the cannabis markets between continents, in terms of availability and potency of cannabis products, and consumption patterns. Moreover, both legal framework and applied law enforcement strategies differ considerably between countries, and have their own (un)intended effects on the organisation, the cultivation techniques, the quality of cannabis products, etc.

This paper offers a review of recent *Dutch-language* research that focuses on cannabis cultivation. Empirical studies were identified through literature searches using relevant search terms and Web of Science, Elin, Social Science Research Network and Elsevier ScienceDirect. Reference lists of key studies were hand searched. Findings were synthesized narratively. Our review does not claim to be comprehensive in relation to the literature on cannabis markets elsewhere in the world, it focuses mainly on published and empirical work from the Low Lands (1 study from Belgium and 5 studies from The Netherlands). In the light of this (selective) review we offer some commentary and analysis concerning the claims made by different stakeholders, and we conclude with some reflections on future research and on policy implications.

Cannabis supply issues in The Netherlands

In Europe, the phenomenon of domestic cannabis cultivation is probably most pronounced in The Netherlands. The feasibility of growing cannabis under artificial lights had already become clear in the United States, where experiments with indoor cultivation were inspired by harsher cannabis policies during the late seventies (Jansen, 2002). But during the eighties The Netherlands presented itself as an ideal 'incubation country' for further developing both the genetics and the production techniques. Many factors might help explain the surge and the success of 'Dutch weed' (Jansen, 2002). The breeding of new cannabis strains to suit different climatic conditions was legal in The Netherlands, as was the production of hemp seeds. The experiments with new production techniques could also benefit from the expertise of a

cluster of enterprises offering services and equipment for intensive horticulture, in which The Netherlands were already a leading nation for decades (Potter, 2008). The 'Green Avalanche' was further stimulated by the increased demand for cannabis, the presence of officially tolerated 'coffee shops' that retail cannabis, the perceived quality of Dutch cannabis among consumers, the emergence of grow shops where all requirements for cannabis production are available without legal impediment, and the dissemination of knowledge of cannabis growing through handbooks, specialized websites and magazines. Finally, the illegal status of the product raises the price of the commodity and makes it an economic viable alternative to an import-led market (Jansen, 2002). Neighbouring countries, such as the United Kingdom and Belgium, may not have had the advantages described earlier, but once the technologies and techniques were developed in The Netherlands there was nothing to stop them disseminating to other European countries. Both in the UK and in Belgium, evidence from growers shows links between the Dutch and neighbouring cultivation scenes (through the internet, through 'travelling consultants', and through specialized literature) (Decorte & Tuteleers, 2007; Decorte, 2007; Potter, 2008).

One of the most influential publications in the Low Countries was the study by Bovenkerk and his colleague Hogewind (2002). On the basis of interviews with police officers, Bovenkerk focused on the profile of professional large-scale producers and organizers of industrial cannabis production, and on the professionalism of and organisations behind plantations discovered by police actions in The Netherlands. He argued that hemp cultivation had become a matter of organized crime, rather than of innocent gardening. Bovenkerk further concluded that although theoretically the far-reaching regularisation of cannabis cultivation by the government would be the most appropriate course of action, in practice this was unfeasible in an international context, and a more consistently repressive position would eventually be inevitable.

The claims that domestic cannabis cultivation and criminal organisations are closely linked were often echoed in the media, and by policy makers and drug warriors, and almost simultaneously comments in the media and elsewhere regarding a large increase in the potency of cannabis have raised concerns that the currently available drug is much stronger than in the past. Annual monitoring of the total THC concentration of THC in cannabis preparations sold in Dutch coffee shops since 1999 showed an important difference: the average level of THC level of Dutch, home-grown cannabis was significantly higher than that of imported cannabis (in 2004 for example 20.4% versus 7.0%), and that the average THC percentage of Dutch cannabis was significantly higher than in previous years, whereas percentages of THC in imported cannabis remained unchanged (Pijlman et al., 2005). Similar increases in average THC-content were observed in the United Kingdom (Potter et al., 2008).

There may not be a causal relationship but shortly after Bovenkerk's study and the claims of greatly increased cannabis potency, the Dutch authorities started to pursue a tough policy. The police and the judiciary, together with electricity companies and housing associations, now take a firm line on home growing (Decorte, 2007). The Dutch strategy largely consists of dismantling large numbers of cannabis cultivation sites. Only to a lesser extent, there are long-term police investigations into criminal networks and organizers of large-scale cannabis cultivation (Wouters, 2008).

Since then a few more recent studies on cannabis cultivation were published. Maalsté has recently published 18 interviews with large-scale cultivators and other entrepreneurs in the commercial cannabis sector (Maalsté & Panhuysen, 2007). These commercially oriented growers testify about the increasingly criminal character of the cannabis trade (threats, possession of weapons, rip-offs and snitching) and associate these recent trends with the intensified repressive approach. Old-school, 'idealistic' cultivators and small-scale growers do not want to run the risk of being caught and stop

cultivating. New, more commercially oriented players who calculate the penalty in as a professional hazard filled the gap in the market. These growers are not always interested in quality and in knowledge about the possibilities of the plant, but they are more interested in strong weed varieties and the financial profit that they can generate. According to some growers, this leads to a scantier supply of varieties, questionable quality, pernicious practices and higher prices (Maalsté & Panhuysen, 2007).

These elements may help explain why many (Belgian and Dutch) users became dissatisfied with the strength and the quality of the cannabis they used to buy in Dutch coffee shops. Together with the dominant discourse on extremely high THC-percentages in Dutch marihuana (and the psychological dangers related to them), and the fact that growing cannabis is actually not very difficult this might have stimulated more (Belgian and Dutch) users to grow their own marihuana.

Whether there is a causal link between these trends on the Dutch and Belgian cannabis market and the pursued policy in recent years, is difficult to verify empirically. However, there is at least more evidence that this policy has failed to have the desired effects. Spapens et al. (2007) studied 19 closed police files to describe and analyse the criminal networks behind marihuana cultivation. Korf and his team analysed police registration practices in several regions of The Netherlands (Wouters et al., 2007; Wouters, 2008). Both studies suggest that the cultivation of cannabis does not appear to have been pushed back. Approximately 6000 cannabis cultivation sites are being dismantled annually (Wouters, 2008). Law enforcement pressure does not seem to have a significant effect on the commercially oriented growers (Spapens et al., 2007), generally because thorough investigations of the organisations behind large-scale cannabis cultivation are extremely time-consuming and costly (Wouters, 2008). The crime investigation policy in relation to the cannabis market in The Netherlands is described as a hit-and-run practice, busting a maximum number of sites with maximum efficiency, but not weighing the potential impact on organized crime. Wouters (2008) describes the actual police practice as increasingly bureaucratized and commercialised (engaging commercial firms in dismantling operations).

Cannabis supply issues in Belgium

Whether or not boosted by the intensified Dutch campaign against cultivation sites, increased cultivation of cannabis has been reported in its neighbouring countries, including Belgium. Police statistics show that in Belgium the number of plantations that have been dismantled by the authorities has increased sharply in recent years, although it must be noted that as few as two or three plants constitute a 'plantation' according to the law (Van Camp, 2008). Reports on cannabis plantations in the Belgian media have multiplied spectacularly since 2001. Many of them are *indoor* operations, often located near the Dutch border, and set up for purely commercial purposes. Although it is often not clear for which (local or foreign) market their production is intended, it is safe to assume that a large proportion of it finds its way to the Dutch coffee shops. Although illicit cultivation is found in nearly every police district in Belgium, the police claim that the large-scale plantations in Belgium (with more than 500 plants) involve a strikingly large number of Dutch citizens—as organizers, growers or suppliers of materials (Soulliaert & Tersago, 2003). According to police claims (and echoed in media reports) the expansion of cannabis cultivation in Belgium appears to be partly a consequence of the stricter treatment to which cannabis cultivation has been subjected in The Netherlands (Decorte, 2007; Vanmullen, 2002). In this discourse, the Dutch are said to export not only their 'nederwiet', but also their cultivation know-how: the increased levels of cannabis cultivation in Belgium have been further boosted by the Dutch grow shops, which

offer new growers all the necessary equipment (Decorte, 2008; Van Camp, 2008).

In the absence of any empirical studies in Belgium, it is virtually impossible to verify these claims scientifically. The police data on cannabis cultivation that are available in Belgium not only show little consistency, but they may also have been influenced at least indirectly by the particular investigation activities and priorities of the local police and judiciary, the growing media focus on cannabis cultivation, changes in legislation and criminal law policy, and citizens' willingness to report cannabis cultivation (Decorte, 2007). Clearly, the increase in cannabis cultivation cannot be explained only by influences emanating from The Netherlands. In Belgium, as in numerous other countries, there is a significant demand for cannabis, and the product appears to have established itself as a 'normal' consumer product among the younger generation. According to spokespeople of the Dutch grow shops, the Drugs Policy Document of the Belgian federal government (2001) and the changes in legislation that it entailed initially resulted in a rush of Belgian citizens who wished to start growing their own supplies.

The discourse on the involvement of the criminal underworld in the production of cannabis has reached Belgium in recent years. Fed by statements from police experts and politicians, the media have been painting a picture of exponentially expanding cannabis cultivation that is increasingly 'professional' and in the hands of organized criminal groups. Criminal control over cannabis cultivation is often portrayed in the Belgian media in terms of the increasing use of pesticides, artificially high THC levels, the installation of booby traps to protect plantations, and the use of cannabis as currency among criminals (Decorte, 2007).

Again, in the absence of independent empirical studies on cannabis cultivation, it is difficult to assess the validity of this representation of the factors and trends that shape the local cannabis markets in Belgium. As for the THC levels in 'Belgian' cannabis, seized cannabis samples were analysed in 2003 and in 2004. It appeared that in 2003 the average THC level was 13.6% in cannabis and 15.2% in hash; in 2004 this average was 13.2% in cannabis and 14% in hash (Van Tichelt et al., 2005). The study did not make a distinction between imported cannabis products and locally produced products. As this was the first ever analysis of its kind in Belgium, its results cannot be compared with any previous year.

The focus on large-scale growers and on police data in the media may lead to false perceptions of the prevalence of different types of growers and growing operations (Wilkins & Casswell, 2003), and an underestimation of small-scale, independent or 'ideological' cultivation. Between January 2006 and December 2007 we conducted a study of small-scale home cultivation in Belgium (Decorte & Tuteleers, 2007). The study consisted of face-to-face interviews with 89 cannabis cultivators through snowball sampling and an anonymous web survey among 659 cannabis cultivators in Belgium. Our findings suggested that small-scale home growers may constitute a significant segment of the cannabis market, not only because considerable numbers of cultivators are involved, but also because of a number of specific characteristics of these producers. If any indoor growing operation that uses sophisticated and efficient cultivation techniques (such as artificial lighting, or the use of nutrients), or to the use of technical equipment is labelled as professionalisation, a large number of small-scale growers appear to become more 'professional' during their growing career, even if they are not explicitly profit-oriented. Elementary knowledge of cultivation techniques is not (or no longer?) the monopoly of a small group of cannabis connoisseurs and large-scale cannabis producers. The minimum know-how to grow cannabis is now easily available through the internet, word-of-mouth among friends, specialized magazines and manuals, and grow shops.

Another noteworthy characteristic of small-scale cannabis growers is their preoccupation with the strength and the quality

of the cannabis they grow in comparison with the cannabis they buy elsewhere (Decorte & Tuteleers, 2007; Decorte, 2008). Most of the cultivators we recruited through the web survey claimed their own cannabis was milder than the marihuana bought elsewhere (e.g. in Dutch coffee shops). Surely, the hypothesis that there is a difference in THC-content between cannabis grown locally by commercially oriented, large-scale producers and cannabis grown locally by small-scale, more idealistic cultivators, needs to be tested scientifically. But heedful of the theorem that 'if men define situations as real, they', the idea that home growers *perceive* their marihuana to be milder may have important consequences, both for their personal patterns of consumption, and for policy strategies.

Our findings suggest that many small-scale domestic cultivators grow cannabis because they are not satisfied with the cannabis products sold by Dutch coffee shops: too 'strong' and 'chemically boosted'. These users want a 'milder', 'healthier' and 'more organic' product. Our findings illustrate this quest for a product of higher quality in several ways (Decorte, 2008). Not only is this desire for 'organic weed' an important motive to start growing, some growers try to refine their cultivation techniques for the same reason. Although they are not looking for monetary gain, many home growers start using 'professional' equipment, both to enhance their yield and to improve the quality of their marihuana. When growers give each other advice and tips, they often emphasize 'organic' growing strategies to keep their cannabis free from mould, bacteria, heavy metals and insecticides.

Implications for future research

The elements presented above make clear that a number of important research questions remain unanswered. Typologies of cannabis cultivators always include large-scale (commercially oriented) growers on the one hand, and small-scale (ideologically oriented) cultivators ('home growers' or 'hobbyists') on the other, and a grey zone in between (the 'social' or 'social-commercial cultivators') (Bovenkerk & Hogewind, 2002; Hough et al., 2003; Weisheit, 1992). But little, if nothing, is known about the exact market share and role of these different types of cannabis producers. What part of cannabis markets is served by small-scale and/or amateur producers, and what part through large(r) organized/criminal networks? What do we really know about the historical evolution in numbers and activities of these different types of cultivators? For example: to what extent has the number of non-commercially oriented cultivators increased or decreased, and what explanations can be found for these trends? Some studies (Decorte & Tuteleers, 2007; Potter, 2006) seem to suggest the market significance of small-scale, independent or 'ideological' cultivation should not be underestimated, but this market segment is still underresearched.

Furthermore, there are major differences in the cannabis markets between continents, in terms of organisation of cannabis markets, availability and potency of cannabis products, and consumption patterns. The question whether cannabis markets differ in shares and roles of different types of cannabis cultivators, and the factors that can help to explain these differences, is another gap in our knowledge that could guide further research.

Moreover, both legal framework and applied law enforcement strategies differ considerably between countries, and have their own (un)intended effects on cannabis markets, etc. From a policy perspective, questions such as 'How do different types of growers react to current drug policy strategies?' and 'What effects does our drug policy have on the strength and/or quality of the cannabis produced locally by different cultivator types?' are extremely relevant, but they remain largely unanswered.

Another question still to be answered is whether different types of cultivators produce different cannabis products. The hypothesis that there is a difference in THC-content and quality between

cannabis grown locally by commercially oriented producers and cannabis grown locally by more idealistic cultivators, needs to be tested scientifically. Nowadays the Dutch coffee shops and other distributors are also selling some varieties of cannabis as 'organic weed' ('bioweed'). Whether the 'organic weed' in the Dutch coffee shops really is any more 'organic' (read: 'healthy') than other varieties, needs to be tested. It might just be a smart marketing strategy. And even if no differences in final products between different types of cultivators are found, the *perceptions* and *ideas* of users and growers on quality and potency of the cannabis they use or grow may have important consequences for their personal patterns of consumption, and are worth studying more in depth.

Implications for policies: advocating regulation of small-scale cultivation

The findings discussed above may also have important consequences for policies. In The Netherlands, the argument that cannabis cultivation had become a case of organized crime inspired the government to instigate a tough policy. However, this highly repressive strategy, including the use of advanced investigation techniques and dismantling of large numbers of cultivation sites, failed to generate the desired effect of significant supply reduction. On the contrary, more recent studies in The Netherlands seem to suggest this policy produced significant side effects on the market (Maalsté & Panhuysen, 2007; Wouters, 2008). In The Netherlands, rather than being driven back, cannabis cultivation has undergone a significant transition. The Dutch strategy seems to have had different effects on small-scale domestic cultivators and on large-scale growers and their organisations.

It looks as if in Belgium politicians and law enforcers want to make the war on domestic cannabis cultivation a national priority too. Police forces are increasingly demanding more staff, advanced equipment and legal enforcement tactics (Soulliaert & Tersago, 2003; Vanmullen, 2002). Considering the unintentional side effects it has had in The Netherlands during the past years, this repressive approach is unlikely to offer a structural solution. It can be expected that in Belgium too, cannabis cultivation will be driven back to some extent (and pop up in different places), but it might also lead to a 'tougher' cannabis market, with more criminal organisation and more criminality. Moreover, the strength and the quality of locally grown cannabis will remain uncontrollable. It is our assumption, that a more repressive approach is bound to lead to a new series of innovations in production, cultivation techniques and market organisation. The cannabis sector (with demanding clients, huge profits for the producers, and a remarkable specialized network of production supporting activities) can easily cope with such a repressive policy (Jansen, 2002).

Any policy that aims to reduce the most harmful aspects of the cannabis market, will need to take into account these and other factors. If politicians can muster the courage to abandon the traditional repressive strategies and authorize decriminalisation experiments in the short term and on a local level, steps can be taken towards a pragmatic and realistic (and hence also a more effective) policy. At first sight, allowing small-scale domestic cannabis cultivation while combating large-scale cultivation, seems an attractive option. Such a strategy would aim at nudging the whole cannabis market towards its least unacceptable form, rather than wanting to eradicate it completely. Cannabis markets have the least unacceptable consequences if criminal entrepreneurs do not crowd them (Hough et al., 2003). By making room for small-scale 'amateur cultivation' in the local marihuana supply, a drug policy can lead to a structure of the sector that offers only few possibilities for 'organized crime'. Several Australian states have decriminalised cultivation for personal use, and imposed administrative penalties (Barratt, Chanteloup, Lenton, & Marsh, 2005; Lenton, 2004). At the time

of writing, the effects of these decriminalisation experiments on the cannabis market structure are not documented. In other countries, such as Canada, Portugal and The Netherlands, proposals for decriminalisation are currently or were recently under discussion.

Unfortunately, even with those experiments it is hard to control the strength and the quality of cannabis on the local market. In view of the large demand for cannabis (rooting out cannabis use is not a realistic goal), the ineradicable nature of the plant and the whole cannabis sector (both legal and illegal businesses), a regulation of the market is the best possible solution in our view. A decriminalisation policy has but a limited durability, as the Dutch have been finding out. The regulation of points of sale, and production and supply, is in our opinion the best strategy to expel the criminal elements from the sector, as well as to improve the quality of the product. The illegal status of the product and its producers, and the impossibility to publicly debate the abolition of an internationally organized prohibition, are increasingly forming the mainstay of the economic engine of domestic cannabis cultivation. They encourage the highly lucrative and criminal nature of the sector to unprecedented heights. At the same time, they constitute significant obstacles to any policy that aims to improve public health.

Acknowledgements

The author wishes to thank Patricia Erickson and Peter D.A. Cohen for their valuable comments on an earlier draft of this paper.

Conflict of interest statement

No conflict of interest.

References

- Asmussen, V. (2009). Domestic cannabis cultivation in Denmark—A matter of identity and sociality? In *Paper presented at the third annual conference of the International Society for the Study of Drug Policy* Vienna, 2–3 March.
- Barratt, M. J., Chanteloup, F., Lenton, S., & Marsh, A. (2005). Cannabis law reform in Western Australia: An opportunity to test theories of marginal deterrence and legitimacy. *Drug and Alcohol Review*, 24, 321–330.
- Bouchard, M. (2007). A capture–recapture model to estimate the size of criminal populations and the risks of detection in a marijuana cultivation industry. *Journal of Quantitative Criminology*, 23, 221–241.
- Bouchard, M., Alain, M., & Nguyen, H. (2009). Convenient labour: The prevalence and nature of youth involvement in the cannabis cultivation industry. *International Journal of Drug Policy*, doi:10.1016/j.drugpo.2009.02.006. Available on-line 2.04.09
- Bovenkerk, F., & Hogewind, W. I. M. (2002). *Hemp cultivation in the Netherlands: The problem of criminality and law enforcement Hennepteelt in Nederland: het probleem van de criminaliteit en haar bestrijding*. Utrecht: Willem Pompe Instituut voor Strafwetenschappen.
- Caulkins, J. P., & Reuter, P. (1998). What price data tell us about drug markets? *Journal of Drug Issues*, 28, 593–612.
- Chin, V., Dandurand, Y., Plecas, D., & Segger, T. (2000). *The criminal justice response to marihuana growing operations in BC*. Abbotsford: Department of Criminology and Criminal Justice, University College of the Fraser Valley.
- Decorte, T. (2007). Characteristics of the cannabis market in Belgium. In J. Fountain, & D. J. Korf (Eds.), *Drugs in society: European perspectives* (pp. 28–38). Oxford/New York: Radcliffe Publishing.
- Decorte, T., & Tuteleers, P. (2007). *Cannabis cultivation in Flanders. Patterns and motives of 748 growers Cannabisteelt in Vlaanderen. Patronen en motieven van 748 telers*. Leuven: Acco Publishers.
- Decorte, T. (2008). Domestic marihuana cultivation in Belgium: on (un)intended effects of drug policy on the cannabis market. In D. J. Korf (Ed.), *Cannabis in Europe: Dynamics in perception, policy and markets* (pp. 69–86). Lengerich: Pabst Science Publishers.
- Dorn, N., & South, N. (1990). Drug markets and law enforcement. *British Journal of Criminology*, 30(2), 171–188.
- Gettman, J. (2006). Marijuana production in the United States (2006). *The Bulletin of Cannabis Reform*, <http://www.drugscience.org/bcr/index.html>
- Hafley, S. R., & Tewksbury, R. (1995). The rural Kentucky marijuana industry: Organization and community involvement. *Deviant Behaviors*, 16, 201–221.
- Hakkarainen, P., & Perälä, J. (2009). Cannabis cultivation in Finland. In *Paper presented at the third annual conference of the International Society for the Study of Drug Policy* Vienna, 2–3 March.
- Hough, M., Warburton, H., Few, B., May, T., Man, L., Witton, J., et al. (2003). *A growing market: The domestic cultivation of cannabis*. Joseph Rowntree Foundation & National Addiction Centre.
- King, A. L., Carpentier, C., & Griffiths, P. (2004). *An overview of cannabis potency in Europe*. Lisbon: EMCDDA.
- Jansen, A. C. M. (2002). The economics of cannabis cultivation in Europe. In *Paper presented at the 2nd European Conference on Drug Trafficking and Law Enforcement* Paris, 26–27 September.
- Lenton, S. (2004). Pot, politics and the press—Reflections on cannabis law reform in Western Australia. *Drug and Alcohol Review*, 23, 223–233.
- Maalsté, N., & Panhuysen, M. (2007). *Dutch marihuana. An image of marihuana cultivation in the Netherlands Polderwriet. Een veelzijdig en onthullend beeld van de wietteelt in Nederland*. Baarn: De Fontein.
- Pijlman, F. T. A., Rigtter, S. M., Hoek, J., Goldschmidt, J., & Niesink, R. J. M. (2005). Strong increase in total delta-THC in cannabis preparations sold in Dutch coffee shops. *Addiction Biology*, 10, 171–180.
- Plecas, D., Dandurand, Y., Chin, V., & Seger, T. (2002). *Marihuana growing operations in British Columbia. An empirical survey (1997–2000)*. Abbotsford, Dept. of Criminology and Criminal Justice, University College of The Fraser Valley.
- Plecas, D., Malm, A., & Kinney, B. (2005). *Marihuana growing operations in British Columbia revisited 1997–2003*. Abbotsford, Dept. of Criminology and Criminal Justice, University College of The Fraser Valley.
- Potter, G. (2006). Weed, need and greed: Domestic marijuana production and the UK cannabis market. Ph Dissertation. University of Sheffield, Department of Law.
- Potter, G. (2008). The growth of cannabis cultivation: explanations for import substitution in the UK. In D. J. Korf (Ed.), *Cannabis in Europe: Dynamics in perception, policy and markets* (pp. 87–105). Lengerich, Pabst Science Publishers.
- Potter, D. J., Clark, P., & Brown, M. B. (2008). Potency of delta-9-THC and other cannabinoids in cannabis in England in 2005: Implications for psychoactivity and pharmacology. *Journal of Forensic Sciences*, 53(1), 90–94.
- Reuter, P., Crawford, J., & Cave, J. (1988). *Sealing the borders: The effects of increased military participation in drug interdiction*. Rand: Santa Monica.
- Rhodes, W., Layne, M., Johnston, P., & Hozik, L. (2000). *What America's users spend on illegal drugs 1988–1998*. Washington, DC: Office of National Drug Control Policy.
- Soulliaert, H., & Tersago, M. (2003). Drugs. Cannabisplantages: een praktische benadering van het onderzoek. In H. Cauwels, & M. Van Damme (Eds.), *Politiepraktijk* (pp. 13–36). Antwerpen: Kluwer.
- Spapens, T., van de Bunt, H., & Rastovac, L. (2007). *The world behind cannabis cultivation De wereld achter de wietteelt*. Den Haag: Boom Juridische Uitgevers.
- Szendrei, K. (1997). Cannabis as an illicit crop: Recent developments in cultivation and product quality. *UNODC Bulletin on Narcotics*, 1, 1–21.
- United Nations Office on Drugs and Crime. (2006). *World Drug Report. Trends in world drug markets: Cannabis markets*. Vienna: UNODC.
- Van Camp, B. (2008). Aspecten van de politionele aanpak van cannabisplantages in België. In T. Decorte (Ed.), *Cannabisteelt in de Lage Landen. Perspectieven op de cannabismarkt in België en Nederland* (pp. 191–203). Leuven: Acco.
- Vanmullen, C. (2002). Cannabisteelt in de lift [Cannabis cultivation on the rise]. *Pol: revue van de federale politie*, 7, 3–5.
- Van Tichelt, K., Canfyn, M., Govaerts, C., Lenaerts, K., Piette, V., & en Parmentier, F. (2005). Δ^9 -THC-concentraties in cannabis in 2003 en 2004. Brussel: Wetenschapselijk Instituut Volksgezondheid.
- Walker, L., Cocklin, C., & Blunden, G. (1998). *Cannabis highs and lows: Sustaining and dislocating rural communities in Northland*. Department of Geography, University of Auckland.
- Weisheit, R. A. (1990). Domestic marijuana growers: Mainstreaming deviance. *Deviant Behavior*, 11, 107–129.
- Weisheit, R. A. (1991a). The intangible rewards from crime: The case of domestic marijuana cultivation. *Crime and Delinquency*, 37(4), 506–527.
- Weisheit, R. A. (1991b). Drug use among marijuana growers. *Contemporary Drug Problems*, 18(2), 191–217.
- Weisheit, R. A. (1992). *Domestic marijuana. A neglected industry*. New York: Greenwood Press.
- Wilkins, S., Battha, K., & Casswell, S. (2002). A demand-side estimate of the financial turnover of the marijuana black market in New Zealand. *Drug and Alcohol Review*, 21, 145–151.
- Wilkins, C., Battha, K., & Casswell, S. (2002). The effectiveness of cannabis crop eradication operations in New Zealand. *Drug and Alcohol Review*, 21, 369–374.
- Wilkins, C., & Casswell, S. (2003). Organized crime in marijuana cultivation in New Zealand: An economic analysis. *Contemporary Drug Problems*, 30, 757–777.
- Wouters, M., Korf, D. J., & Kroeske, B. (2007). *Tough policy, hot summer. A study of dismantling of hemp plantations in the Netherlands Harde aanpak, hete zomer. Een onderzoek naar de ontmanteling van hennepkwekerijen in Nederland*. Amsterdam: Rozenberg Publishers.
- Wouters, M. (2008). Controlling cannabis cultivation in the Netherlands. In D. J. Korf (Ed.), *Cannabis in Europe: Dynamics in perception, policy and markets* (pp. 51–68). Lengerich, Pabst Science Publishers.