NOTES


2 National Drug Intelligence Center, National Drug Threat Assessment 2006, United States Department of Justice.


5 ARQ 2003.

6 National Drug Intelligence Center, National Drug Threat Assessment 2006, United States Department of Justice.


10 National Drug Intelligence Center, National Drug Threat Assessment 2005, United States Department of Justice.

11 International Narcotics Control Board, Report 2005, p.56

12 Based on data from the National Survey on Drug Use and Health.

13 Based on data from the Monitoring the Future Survey.

14 ARQ 2004


17 ARQ 2005


19 National Drug Intelligence Center, National Drug Threat Assessment 2005, United States Department of Justice.

20 In 2003, France reported that 82 per cent of the cannabis resin found in France in 2002 originated in Morocco. Similar estimates have been made for Belgium (80%), Sweden (85%), and the Czech Republic (70%). Spain, Italy, Denmark, Finland and Ireland reported that almost all of the cannabis resin originated in Morocco.


25 Ibid.


27 Evans, M. ‘Ni paix ni guerre : The political economy of low level conflict in the Casamance.’ Background research for Humanitarian Policy Group Report 13, Overseas Development Institute, February 2003; Evans, M., ‘Senegal: Mouvement des Forces Democratiques de la Casamance (MFDC)’. Chatham House Africa Programme Armed Non-State Actors Project Briefing Paper 2, December 2004

28 Ibid.


34 ARQ 2003.


37 ARQ 2003.


43 Ibid.


45 SENAD, op cit.


55 ARQ 2003


59 National Drug Intelligence Center, National Drug Threat
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Assessment 2005, United States Department of Justice.


64 Bundeskriminalamt, 2005, op cit, p. 35.

65 ARQ 2003 and 2004


68 ARQ 2003 and 2004


73 1998 INCSR.

74 1998, pp. 249 - 273


76 ARQ 2004.

77 ARQ 2003.


79 ARQ 2003.


83 Ambekar et al 2005 op cit.

84 National Drug Intelligence Center, National Drug Threat Assessment 2005, United States Department of Justice. See also Centre for Geopolitical Drug Studies, ‘Cannabis and the Maoist Rebellion.’ Geopolitical Drug Newsletter No 1, October 2001.

85 Ambekar et al 2005 op cit.


88 2005 Annual Report on Drug Abuse in China, National Surveilliance Center on Drug Abuse, National Institute on Drug Dependence, University of Beijing, February 2006, p.28

89 The largest missing production area is Africa, where data on production and seizures are difficult to reconcile with other available information. Lebanon, which reported over 11,000 hectares in 2002, is also not included, as this area was reported eradicated, and the country's 2003 ARQ response estimated just over 700 hectares of cultivation.

90 The “herbal equivalent” figure is used because hashish seizures actually represent at least 25 times the land area needed to produce the same weight of product.

91 For a discussion of the reliability of the survey data, see National Research Council, Informing America’s Policy on Illegal Drugs: What we don’t know keeps hurting us. Washing-


96 Landrace’ strains are those that have evolved over a period of time in a particular geographic region, e.g. ‘Acapulco Gold’.


98 The term ‘skunk’ appears to have been coined in reference to an important early Indica/Sativa cross which was perceived as particularly pungent by users accustomed to Sativas.


102 Data from the University of Mississippi Cannabis Potency Monitoring Project.


104 King et al 2004, op cit.

105 For example, then Home Secretary of the United Kingdom, Mr Charles Clarke, asked the Advisory Council on Misuse of Drugs to consider whether ‘skunk’ should be excepted from the downgrading of cannabis from a Class B to a class C drug. Travis, A. ‘Senior police fear u-turn on classification of cannabis’. The Guardian, 21 September 2005.

106 There have also been a number of technological innovations that have lost currency. The use of carbon dioxide enriched environments to boost yields has largely been abandoned, due to the greater importance of good air circulation in the hot and humid environment of an indoor grow. The use of ‘feminised’ seeds, produced from hermaphrodite mothers, has also lost popularity, as the risk of further hermaphrodites (and thus pollen contamination) is a threat, and it is much easier to work with female clones.


109 Bruining, op cit.

Human Services, June 1980, p.12.

111 The MPMP only analyses those samples seized under the supervision of the national (federal) government, whereas most routine law enforcement in the country is conducted at local (municipal) level. The cannabis samples seized by local agents may be expected to differ from those consumed by the general public, given the level at which most federal efforts are pitched, including large-scale and import interdiction. This is especially important given the data on the extent of small scale production and social network distribution.

112 The technique used determines which of these two values is captured. High performance liquid chromatography tests for delta-9 THC, while gas chromatography tests for total THC. The latter is probably the most appropriate if the goal is to determine what users are ingesting, because other forms of THC become delta-9 THC in the process of smoking.


115 Graeme Newman and Jack Reed (SUNY-Albany), quoting U.S. Department of Justice, Drug Enforcement Administration, 1985 Domestic Cannabis Eradication/Suppression Program Report (p. 7); 1987 Domestic Cannabis Eradication/Suppression Final Report (p. 4); 1990 Domestic Cannabis Eradication/Suppression Program (p. 6); U.S. Department of Justice, Bureau of Justice Statistics, 1991 Sourcebook of Criminal Justice Statistics (p. 483); 1992 (p. 468); 1993 (p. 464); 1994 (p. 421); 1995 (p. 439); 1996 (p. 412); 1997 (p. 369); 1998 (p. 376); 1999 (p. 389); 2000 (p. 401); 2001 (p. 388); 2002 (p. 390); and Sourcebook of Criminal Justice Statistics Online: http://www.albany.edu/sourcebook/dbs.pdf.

116 National Drug Intelligence Center, National Drug Threat Assessment 2005, United States Department of Justice, p. 41

117 UNODC, 2003 Annual Report Questionnaire.


120 Governments of Canada and the United States, United States/Canada Border Drug Threat Assessment, October 2004

121 Ibid.


136 National Advisory Committee on Drugs and Drug and Alcohol Information and Research Unit, 2005, op cit.


139 The NSDUH surveys in the United States have shown that trends in cannabis use levels are strongly linked to public-per...


193 Field and Arndt 1980, op cit. Absence of CBD was noted in samples from Brazil, Costa Rica, Cyprus, Nigeria, and other parts of Southern Africa. India and Mexico have produced both low and high CBD samples. See Baker, P., T. Gough, B. Taylor, 'Illegal imported cannabis: Its products: Solving typical and chemical figures indicative of their origin.' Bulletin on Narcotics, Issue 1, 1980, pp. 31-40. Other low CBD varieties are found in Burma, Ghana, Jamaica, Kenya, and Thailand.

194 Zuardi, A., Guimarães, F., Guimarães, V., Del Bel, E. 'Marihuana use in rural and urban Jamaica.' Philadelphia: Institute for the Study of Human Issues, 1982, as cited in Grinspoon, L., J. Bakalar, E. Russo, 'Marihuana', in Lowinson, J. (ed) Substance abuse: A comprehensive textbook. Philadelphia: Lippincott Williams and Wilkins, 2004, as quoted to Grinspoon, "Many psychiatrists in India, Egypt, Morocco, and Nigeria have declared emphatically that the drug can produce insanity." It is possible that at least the Indian and Nigerian reports may be rooted in the low CBD plants available in these areas.


202 UNODC Annual Reports Questionnaire and Delta database.


204 Richardson et al., 2002, op cit.


208 Richardson et al., 2002, op cit.


210 Indoor, cannabis plants can be kept alive indefinitely, even after harvesting, by reverting back to a vegetative photoperiod, but this practice is rare, as it generally involves more time and effort than starting fresh from clones. See Baker, P., T. Gough, B. Taylor, 'Illegal imported cannabis: Its products: Solving typical and chemical figures indicative of their origin.' Bulletin on Narcotics, Issue 1, 1980, pp. 31-40. Other low CBD varieties are found in Burma, Ghana, Jamaica, Kenya, and Thailand.

211 Aside from noting its extreme adaptability and aggressive nature, the authors point out those areas where cannabis is the most important inhibiting factor, as cannabis has not successfully spread. Looking at the state of Illinois, which at that time was considered to be at the heart of the "cannabis belt" in the US, Haney and Bazzaz show that the plant is non-existent in the south-east part of the state. This area is characterised by tight soil that is low in nitrogen and high in clay. Of these two factors, the authors reckon that clay is the most important inhibiting factor, as cannabis has been found growing in very sandy soil with low nitrogen content. Haney, A. and F. Bazzaz, 'Some ecological implications of the distribution of Hemp (Cannabis sativa L.) in the United States of America.' In Joyce, C. and S. Curry, The botany and chemistry of cannabis.' London: Churchill, 1970, pp. 39-47.

212 Since it still debated whether these varieties are true species, their names will be used in this report without italics.

213 The term was first used by Janischevsky in 1924, who concluded that it was probably a well marked variety, rather than a species.

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226 According to article 1 (d) of the 1961 Single Convention on Narcotic Drugs, cannabis resin is the separated resin, whether crude or purified, obtained from the cannabis plant.

227 King, L., C. Carpentier, P. Griffiths, ‘An overview of cannabis


229 One recipient of medical grade cannabis in the United States reported cleaning even this product to the extent that 25 per cent of the material was lost. See Russo, E., M. Mathare, A. Byrne, R. Velin, P. Bach, J. Sanchez-Ramos, K. Kirin, ‘Chronic Cannabis Use in the Compas Medical Marijuana Access Program: An Examination of Benefits and Adverse Effects of Legal Clinical Cannabis.’ Journal of Cannabis Therapeutics, Vol 2, No 1, 2002, p. 20.

230 British Columbia Compassion Club Society. ‘Response to Health Canada’s proposed medical marijuana access regulations.’ Canada Gazette, Part 1, April 7, 2001, p. 5.

231 This is the typical size of US government produced joints (0.18g to 0.26 g). Joints rarely exceed half a gram. Buchanan, B., D. O’Connell, ‘Survey on cannabis resin and cannabis in unsmoked handrolled cigarettes.’ Journal of Forensic Science 22, 1982, pp. 291-292.


234 This is the figure used by the United States Drug Enforcement Administration.


236 For example, the United States Drug Enforcement Administration, in cooperation with the National Center for Natural Products Research at School of Pharmacy of the University of Mississippi, undertook a study of outdoor cannabis yields in 1990 and 1991 using different (mainly sativa) seed stocks and planting at different densities. Plants grown at ‘dense’ spacings (between 0.91 and 1.28 metres between plants) produced between 215 and 274 grams per plant, while plants given more room (up to 2.74 metres between plants) produced higher yields, including one plant that produced 2.3 kg of cannabis. The study concluded that, “a very significant factor affecting yield was planting density.” Indeed, squaring the space per plant resulted in per plant yields increasing as much as four fold. But this increase does not represent the most efficient use of land area, as the yield per unit area, as, on average, the densest plantings were more than twice as productive per unit area as the most widely spaced.


239 This figure was formerly used by the DEA. The DEA’s figure also conflicts with the 100 grams a plant later affirmed United States Sentencing Commission as appropriate when looking at mixed gender crops. “The one plant = 100 grams of marihuana equivalency used by the Commission for offenses involving fewer than 50 marihuana plants was selected as a reasonable approximation of the actual yield of marihuana plants taking into account (1) studies reporting the actual yield of marihuana plants ... (2) that all plants regardless of size are counted for guideline purposes while, in actuality, not all plants will produce useable marihuana ...; and (3) that male plants, which are counted for guideline purposes, are frequently culled because they do not produce the same quality of marihuana as do female plants.” Federal Register 60 (May 10, 1995): 25078, as quoted in Gettman, J and P Armentano, 1998 Marijuana Crop Report, NORML, October 1998. This figure was extended to all crops, including those involving more than 50 plants. See also United States Sentencing Commission, 1995 Annual Report, p. 148. USSG SS 1B1.10, 2D1.1(c)(E) (Nov. 1995).

240 Conrad, op cit.


248 National Advisory Committee on Drugs and Drug and Alcohol Information and Research Unit, 2005, op cit.


252 Ibid.

253 This is the figure used by the United States Drug Enforcement Administration, in cooperation with the National Center for Natural Products Research at School of Pharmacy of the University of Mississippi, undertook a study of outdoor cannabis yields in 1990 and 1991 using different (mainly sativa) seed stocks and planting at different densities. Plants grown at ‘dense’ spacings (between 0.91 and 1.28 metres between plants) produced between 215 and 274 grams per plant, while plants given more room (up to 2.74 metres between plants) produced higher yields, including one plant that produced 2.3 kg of cannabis. The study concluded that, “a very significant factor affecting yield was planting density.” Indeed, squaring the space per plant resulted in per plant yields increasing as much as four fold. But this increase does not represent the most efficient use of land area, as the yield per unit area, as, on average, the densest plantings were more than twice as productive per unit area as the most widely spaced.

254 DEA 1992 op cit, p. 5.


256 This figure was formerly used by the DEA. The DEA’s figure also conflicts with the 100 grams a plant later affirmed United States Sentencing Commission as appropriate when looking at mixed gender crops. “The one plant = 100 grams of marihuana equivalency used by the Commission for offenses involving fewer than 50 marihuana plants was selected as a reasonable approximation of the actual yield of marihuana plants taking into account (1) studies reporting the actual yield of marihuana plants ... (2) that all plants regardless of size are counted for guideline purposes while, in actuality, not all plants will produce useable marihuana ...; and (3) that male plants, which are counted for guideline purposes, are frequently culled because they do not produce the same quality of marihuana as do female plants.” Federal Register 60 (May 10, 1995): 25078, as quoted in Gettman, J and P Armentano, 1998 Marijuana Crop Report, NORML, October 1998. This figure was extended to all crops, including those involving more than 50 plants. See also United States Sentencing Commission, 1995 Annual Report, p. 148. USSG SS 1B1.10, 2D1.1(c)(E) (Nov. 1995).


259 This figure was formerly used by the DEA. The DEA’s figure also conflicts with the 100 grams a plant later affirmed United States Sentencing Commission as appropriate when looking at mixed gender crops. “The one plant = 100 grams of marihuana equivalency used by the Commission for offenses involving fewer than 50 marihuana plants was selected as a reasonable approximation of the actual yield of marihuana plants taking into account (1) studies reporting the actual yield of marihuana plants ... (2) that all plants regardless of size are counted for guideline purposes while, in actuality, not all plants will produce useable marihuana ...; and (3) that male plants, which are counted for guideline purposes, are frequently culled because they do not produce the same quality of marihuana as do female plants.” Federal Register 60 (May 10, 1995): 25078, as quoted in Gettman, J and P Armentano, 1998 Marijuana Crop Report, NORML, October 1998. This figure was extended to all crops, including those involving more than 50 plants. See also United States Sentencing Commission, 1995 Annual Report, p. 148. USSG SS 1B1.10, 2D1.1(c)(E) (Nov. 1995).

260 Conrad, op cit.

261 Trimbos Institute, Nationale Drugmonitor Jaarbericht 2002, as quoted in King 2004 op cit.


Australian Institute of Health and Welfare 2004 op cit


Australian Institute of Health and Welfare 2004 op cit


Average of samples submitted to the Marijuana Potency Monitoring Project for the first three quarters of 2004.

The WHO uses a much wider range of possible values in its own calculations, however, arguing that the THC in an average joint (.5 to 1 g of cannabis with a THC content of between 1 per cent and 15 per cent) ranges from 5 mg and 150 mg, of which 5 per cent to 24 per cent actually enters the blood when smoked. This gives a range of .25 mg to 36 mg THC being absorbed from a single joint, so individual experiences may vary by a factor of 144. Grotenhermen argues that 0.03 to 0.1mg THC per kilogram of body weight is needed, or 2 to 5 mg for an adult. Grotenhermen, F., ’Practical hints.’ In F. Grotenhermen and E. Russo, *Cannabis and Cannabinoids: Pharmacology, Toxicology, and Therapeutic Potential*. New York: Haworth, 2002, p. 351.

Using Grotenhermen’s upper threshold of 5mg, this would be 20 per cent (with good technique) to 66 per cent (with poor technique) of a joint.

Grotenhermen adds a “dose for a marked intoxication” at 10-20 mg. This is still less than an entire joint if the user’s technique is any good.

Wilkins et al op cit, p. 35-36.


One study found that between one and five grams of cannabis with THC levels between 10 per cent and 20 per cent would be necessary to deliver 30 to 90 mg of THC, the daily dosage of synthetic THC. Carter et al op cit. The study notes that this figure corresponds well with actual average use levels reported by California and Washington medical cannabis projects, as well as dosages used in clinical studies.


The standard sales unit in various locations provides some clues as to dose levels. In the US, cannabis is sold in fractions of an ounce: one sixteenth (1.75 g, enough for two to four joints), eighth (3.5 g, enough for four to eight joints), quarter (7 g, enough for eight to 14 joints), and one full ounce (28 g, enough for up to 50 joints). A daily user consuming one or two joints a day would therefore use between a half and a full ounce a month. In Italy, hashish was sold in 2000 by the deca (10,000 lira worth) which amounted to about 0.7 gram, enough for one or two joints. Paoli, L. *Illegal drug markets in Frankfurt and Milan*. Lisbon: European Monitoring Centre for Drugs and Drug Addiction, 2000, p. 121.


Ninety-two percent used at least two times a week, 86 per cent four or more times a week, and 60 per cent daily.


In the United States, a study found self-reported use of a tobacco/cannabis mixture of between two and four ounces a day. This represents the equivalent of smoking, on the high end, 56 grams or 112 standard (0.5 g) joints of pure cannabis of good quality per day, completely off the scale of other use studies. Schaeffer, J., T. Andrysak, J. Ungerleider, ‘Cognition and long-term use of ganja (cannabis).’ *Science*, Vol 213, 1981, pp. 465-466.

In Jamaica, Rubin and Canitas delineated three types of daily smokers – light (one to four spliffs daily), moderate smokers (four to seven), and heavy smokers (more than eight). The average level of use was seven spliffs of two to three grams of cannabis of just under 3 per cent THC, combined with tobacco. This represents an average of about 18 grams per day of rather weak cannabis, the equivalent of 36 standard 0.5 g joints. Rubin, V L. Comitas, *A study of the effects of chronic ganja smoking in Jamaica*. Research Institute for the Study of Man, New York, as cited in Shafer, Raymond P, et al, 1972, op cit. This work has been criticised as “extremely excessive” and not representative of present use levels. Van Selinge, T., ‘Ganja in Jamaica.’ *Amsterdams Gids Tijdschrift*, No 2, 1996, pp. 11-14.