

sible to die of an overdose of cannabis. Because it is relatively cheap in most markets, crimes associated with acquiring money for cannabis dependency are limited. In many parts of the developed world, cannabis is regarded as a soporific, and the behaviour of the intoxicated as humorous, not dangerous. For many, it is a point of faith that cannabis is harmless, the victim of relentless disinformation.

It is true that much of the early material on cannabis is now considered inaccurate, and that a series of studies in a range of countries have exonerated cannabis of many of the charges levelled against it. But the latest research indicates that the pendulum may have swung too far in the opposite direction. There are serious mental health consequences associated with cannabis, including a significant risk of dependency, precipitation and aggravation of psychosis, and acute dysphoric episodes. These risks appear to be higher for people who start consuming cannabis during adolescence. Each year, thousands of people seek medical attention for problems related to their cannabis use, and this number appears to be growing. Cannabis is not the harmless herb often portrayed, but a psychoactive drug that deserves to be taken seriously.

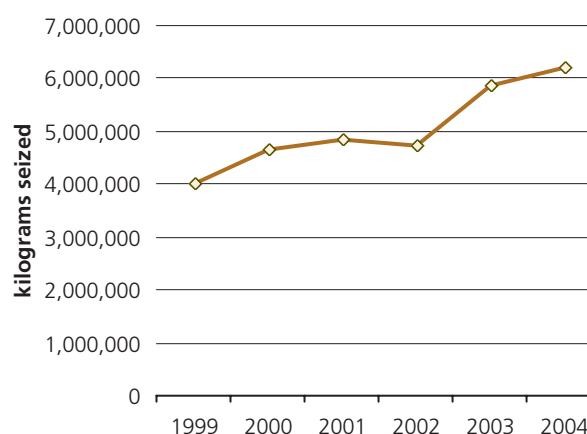
One reason these serious effects are only being appreciated now is that they appear to be related to the growth of high-potency cannabis in many countries where such research is commonly done. For the last several decades, cannabis breeders and cultivation experts have laboured to transform the plant, creating a much more potent and productive version of the drug previously reviewed. These developments were reviewed, along with other aspects of the cannabis market, in a double issue of the *Bulletin on Narcotics* (Volume XLIX, Nos.1 and 2, 1997; Volume L, Nos.1 and 2, 1998). The situation has advanced considerably since that time. High-potency cannabis may be responsible for the growing number of people seeking help for cannabis problems in developed countries around the world. Although most of the cannabis consumed globally is grown the traditional way, the problems associated with the 'new' cannabis may simply be large-print versions of issues not recognized before.

2.2. The world's biggest drug market is growing and uncharted

All available indicators suggest that global cannabis production, after having fallen in the late 1980s (mainly due to large-scale eradication in Latin America), rose

again in the 1990s and continues rising in the new millennium. The volumes of cannabis seized by the police internationally have been increasing since the early 1990s, and surveys show that global demand has also increased. An estimated 162 million people used cannabis in 2004, over 10 per cent more than in the late 1990s. According to expert opinions solicited from Member States in 2004, far more countries felt that cannabis use was increasing (59 per cent of 97 countries responding) than declining (13 per cent) in 2004. In the last decade, the consensus is that cannabis use has been growing faster than the use of cocaine or opiates.

Fig. 1: Global cannabis seizures



Sources: Annual Reports Questionnaire Data.

Exactly how widespread is cannabis cultivation? One way to find out is to ask the law enforcement authorities in every country in the world whether cannabis is grown in their country, and this is precisely what the UNODC does. Each year, UNODC receives responses from Member States to its Annual Reports Questionnaire (ARQ), a survey of national Governments on their local drug situations. The ARQ contains questions about the extent of cannabis cultivation and use. Most are unable to give estimates on the extent of cannabis cultivation in their countries, and those that do often give questionable responses. But quite a few admit that cannabis is produced in their countries, and their other responses are revealing as well.

Over the 1994-2004 period, 82 countries provided UNODC with cannabis production estimates. For comparison, only six provided estimates for coca-leaf

Types of cannabis

Several drug products can be produced from cannabis, falling into three main categories:

- 'herbal cannabis', the leaves and flowers of the plant, also known as 'marijuana', 'ganja', and a host of other names;
- 'cannabis resin', the pressed secretions of the plant, commonly referred to as 'hashish' in the Western countries or 'charas' in India.
- 'cannabis oil'.

Herbal cannabis is most popular in North America and most of the rest of the world, while cannabis resin is most popular in much of Europe and a few traditional resin-producing regions.

production. But the fact that a country did not provide an estimate does not mean that no cultivation exists, as some countries simply lack the capacity to come up with accurate estimates. Luckily, there are other ways of identifying cannabis producing countries.

In the ARQ, Member States are also asked to identify the national source of the cannabis consumed in their countries. This evidence is often based on considerable experience in the field, and its value should not be underestimated. On this basis, 142 producer countries can be identified.

A third list of producer countries can be generated by singling out those that report the seizure of whole cannabis plants. It is extremely inefficient to transport whole plants internationally, as only certain parts are useable as a drug. Thus, when a whole plant is seized, it is very likely that it was locally produced. Seizures of whole cannabis plants were reported in 141 countries during the 1993-2004 period. Combining these three lists results in the identification of some 176 countries and territories where cannabis is produced, out of 195 countries reporting (90 per cent).

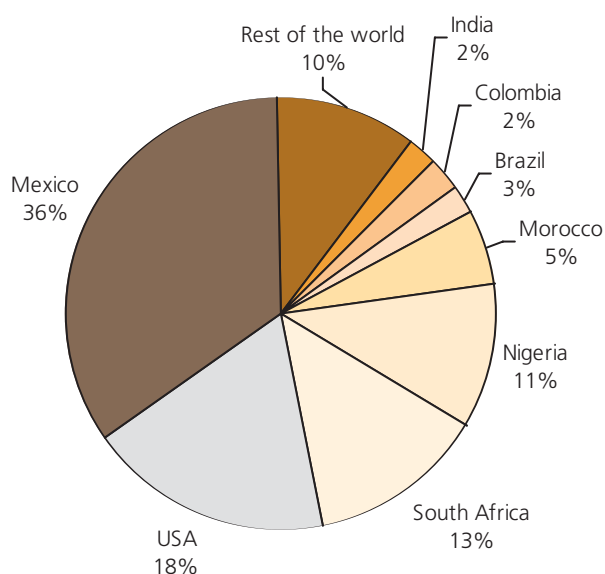
Of course, evidence of some cultivation does not mean the practice is large in scale. Many of these 176 countries produce primarily to satisfy local demand, but

there are a number of countries that produce for mass export. For example, Paraguay produces much of the herbal cannabis consumed in its neighboring countries, and European production hubs include Albania and the Netherlands. Much of the world's resin supply comes from Morocco and Afghanistan. Other significant exporters include:

- in Africa: Nigeria, South Africa, Malawi, Lesotho, Swaziland
- in the Americas: Mexico, Canada, Jamaica, Colombia
- in Central Asia: Kazakhstan, Kyrgyzstan
- in the Middle East: Egypt, Lebanon
- in South Asia: India, Pakistan
- in Southeast Asia: Cambodia, Thailand, Philippines

More cannabis herb is seized, and it is seized in a wider range of locations, than any other drug in the world, although 90 per cent of global seizures by weight occur in just eight countries. Global cannabis herb seizures were over 6,000 metric tons in 2004, and 135 countries reported seizures of cannabis herb, more than for cocaine (119), heroin (114), cannabis resin (83), ecstasy (69), and amphetamines (47). Cannabis herb seizures have been rising continuously over the past decade, and were 162 per cent higher in 2004 than in 1994.

Fig. 2: Country shares of global herbal cannabis seizures in 2004



Sources: Annual Reports Questionnaire Data.

In recent years, most of global cannabis herb seizures have occurred in North America (with Mexico, United States, and Canada accounting for 52 per cent in 2004), usually followed by Africa, Latin America, and Europe. This has not always been the case: North America was only responsible for 32 per cent of global seizures in 1990. As the chief supplier to the North American market, Mexico is the perennial world leader in cannabis seizures, seizing 2,164 tons or 35 per cent of the global total in 2004. Africa's share has been increasing and Latin America's declining over the last 15 years.

But seizure figures also depend on the attention given by national law enforcement authorities to drug interdiction. While seizures give an idea of the minimum of the amount of the drug present in a society, the lack thereof does not discount the possibility of substantial markets, and it is never clear how much the tip constitutes of the iceberg. Global seizure figures do show that cannabis is everywhere, though the specifics of any given market remain rather obscure. The following quick tour of cannabis throughout the world underscores the diversity and the ubiquity of this drug.

Cannabis is everywhere

North America: the world's biggest cannabis market

In financial terms, there can be little doubt that North America constitutes the world's largest cannabis market. With high prices and a large user base, the North American market alone has been valued at US\$ 10 billion to 60 billion, depending on the underlying production estimates. Most of this demand is satisfied by North American production.¹ It is also one of the best understood markets, due the attention paid to the issue by the United States government in particular. Estimates made available to UNODC suggest that North America accounts for about one third of global production, or 14,000 metric tons.

Judged simply on the basis of seizures, Mexico would appear to be the largest herbal cannabis producer in the world, responsible for a reported 36 per cent of the cannabis seized globally in 2004, over 2,000 metric tons. Cannabis production was estimated at 13,500 tons in 2003, declining to 10,400 tons in 2004, with a corresponding decline in cultivation area from 7,500 hectares to 5,800 hectares.²

Such wide-scale production calls to mind images of sprawling cannabis plantations, but, remarkably, most

Mexican cannabis production occurs in small concealed plots averaging less than 1,000 square metres.³ This is due to the country's intensive eradication programme, which destroyed an estimated 31,000 hectares in 2004. If these estimates are correct, upwards of 80 per cent of all the cannabis cultivated in Mexico is destroyed each year, and the large United States market is primarily supplied by the residual 20 per cent.

The Mexican authorities divide cannabis production into two major zones: the Pacific region, responsible for 52 per cent of production, and the Central-North area, responsible for 47 per cent. In recent years, the share cultivated in the Pacific has declined, and that in the Central-North area has increased. The Mexican government says they have eradicated almost all of the crops located in the top 10 producer provinces since 1994, but that residual areas remain in the Sierra Madre mountains.⁴ Cultivation micro-regions occur in a long arc through the Sierra Madre Occidental to the Sierra Madre del Sur, roughly coincident with the opium producing areas. The Government of Mexico estimates that 70 per cent of its cannabis is destined for the United States and 30 per cent for local markets.⁵

This would suggest that about 3,000 tons of cannabis are reserved for domestic use. Current estimates of cannabis consumption among the adult population, based on a 2002 survey, indicate that only 1.6 per cent of the population uses cannabis annually. This allows nearly 2 kilograms of cannabis per user per year, or 5 grams per user per day, equivalent to about 10 American-sized joints, which appears to be much too high. Either the production figures are exaggerated, the estimate on the share of production remaining in the country excessive, or the number of users is greater than the survey data would indicate. Given the volume of drugs in the country, the latter explanation is the most likely.

The United States ranks second in seizures of herbal cannabis, seizing some 1,118 metric tons in 2004, an estimated 18 per cent of the world's total. While cultivation has been discovered in every one of the country's 50 states, most of the large-scale cannabis production seems to be concentrated in just a few areas. Eradication reached a new high in 2005 to over 4 million plants seized, with counts highest in California, Kentucky, Tennessee, Hawaii, and Washington.⁶ This is a different profile from previous decades, where the Midwest played a more prominent role.

In recent years, much of the outdoor production in the United States has been found in so called 'guerrilla

grows' on public lands, such as the national forests and parks of California and Kentucky. As enforcement strengthens in California, outdoor cultivation has moved to public lands in Oregon and Washington.⁷ Rangers eradicating crops on public lands in California are frequently met with violent resistance from the organized crime groups controlling the trade, and booby traps on guerrilla grows are not uncommon.

US authorities claim that domestic cannabis production is increasingly controlled by Mexican organized crime groups. While polls conducted in the United States suggest that much of cannabis cultivation and distribution takes place via social networks, a more than US\$10 billion market attracts organized crime elements. A recent assessment of gang activity in the United States found that 65 per cent of law enforcement agencies polled said that gangs were involved in the distribution of cannabis in their areas, a much higher share than for any other drug.⁸

The lack of consensus on the amount of cannabis produced in the United States highlights the fact that even countries with sophisticated monitoring systems struggle to come up with credible estimates of the extent of domestic cannabis cultivation. One government estimate placed production at between 3,100 and 7,100 metric tons in 2004,⁹ but other figures have placed it as high as 19,000 tons.¹⁰ The high end of these estimates is very difficult to reconcile with what is known about global production. The International Narcotics Control Board, in its annual report for 2005, suggests that 10,000 tons of cannabis are produced each year in the United States, a significant share of the global total.¹¹

Some 11 per cent of the US population over the age of 12 uses cannabis annually, including 28 per cent of people aged 18-25¹² and over a third of children in their final year of high school.¹³ The United States Office of National Drug Control Policy has estimated that these users consumed, on average, a remarkable 19 joints a month containing 0.4 grams of cannabis in 2000, for a total consumption of over 1,000 metric tons of cannabis. While the amount of cannabis consumed per user seems remarkably high, given that a large share of these are casual users, the total consumed is rather low, about a third of the lowest estimates of domestic production alone, let alone imports.

In the past, both Jamaica and Colombia were major suppliers of cannabis to the United States, but it would appear that both have been displaced by the rise of Mexican organized crime to its current position of dominance, and the growth of Canadian production. Jamaica

is still a major supplier to the rest of the Caribbean, along with St Vincent and the Grenadines.

In Canada, an estimated 960 to 2,400 metric tons of cannabis are produced annually.¹⁴ Canada has also stepped up enforcement, seizing 1.1 million plants per year between 1998 and 2002, a six-fold increase over 1993.¹⁵ Cannabis of Canadian origin is trafficked mostly to the United States but reportedly also to Asia, including Taiwan Province of China and Japan.

Formerly, most of Canadian production had been concentrated in British Columbia, but this is no longer the case. Seizure and eradication figures suggest that Ontario and Quebec have recently caught up, and, more recently, major operations have been detected in other provinces.¹⁶ At present, about 40 per cent of Canada's cannabis is produced in British Columbia, with 25 per cent coming from Ontario, 25 per cent from Quebec, and 10 per cent from other provinces.¹⁷

In Canada, most of the medium and large cannabis production operations are controlled by organized crime. Outlaw Motorcycle Gangs, such as the Hell's Angels, control outdoor and hydroponic (plants grown indoors in a nutrient bath, rather than soil) grows, while Vietnamese groups control indoor organic (soil-based) production.¹⁸ Previously, cross-border trafficking was conducted by small-scale traffickers, and the growth of organized crime involvement is reflected in the growing size of shipments across the border.¹⁹ Money derived from cannabis operations may be allowing minor organized crime groups to graduate to weapons and explosives trafficking, cocaine smuggling, and stock-market fraud.

The Americas as whole are estimated to have a cannabis production of around 24,000 metric tons.

Africa: Massive seizures, uncertain origins

With an estimated production of 11,000 metric tons, Africa is the second largest producer of herbal cannabis in the world. After North America, Africa leads the world in herbal cannabis seizures and is growing in importance: in 1990, only 16 per cent of world cannabis seizures were made in Africa, but by 2004, it was more than 30 per cent. In 2004, 818 metric tons of herbal cannabis were seized in South Africa alone, ranking third in the world, after Mexico and the United States.

Production takes place in all sub-regions in Africa, with major seizures being made in North Africa (Morocco and Egypt), West Africa (Nigeria and Ghana), East

Africa (Tanzania and Kenya), and Southern Africa (South Africa, Swaziland, Lesotho, Malawi, and Zambia). Much of this product is consumed on the continent, as an estimated 8 per cent of African adults consume the drug each year, but there are also substantial exports to Europe, and, to a lesser extent, to Asia.

Morocco is the world's largest producer of cannabis resin, and possesses the largest documented cannabis cultivation area. Morocco produces about 80 per cent of the resin consumed in Europe,²⁰ and Western Europe was responsible for about 74 per cent of global seizures in 2004.

The Government of Morocco, in cooperation with UNODC, has conducted comprehensive cannabis resin surveys of the country for the last three years. The 2003 survey placed total resin production at about 3,070 tons, cultivated on 134,000 hectares of land in the Rif region by some 96,600 families, providing income for about 800,000 people. The 2004 survey showed a 10 per cent decline in the land dedicated to cannabis cultivation (120,500 ha), with production falling to 2,760 tons. Drought, combined with eradication efforts, resulted in a strong decline in production in 2005.

In 2004, the total gross farmers income from cannabis cultivation is estimated at about US\$325 million. Based on an estimate of some 804,000 persons benefiting from cannabis cultivation in the Rif region, this represents a gross per capita income of US\$400, well below the country's overall 2003 GDP per capita of US\$ 1,478. Clearly, cannabis production in Morocco is the recourse of poor farmers, who do not make a great deal off the trade.

Aside from Morocco, credible estimates of the number of hectares under cannabis cultivation are difficult to find in Africa. In South Africa, the best developed country in sub-Saharan Africa, estimates vary, but are generally between 1,000 and 2,000 hectares, located mostly along the east coast of the country. Most plots are small, averaging about 300 square metres.²¹ South Africa is a significant source of cannabis exports to Europe. For example, in 2004, the Republic of Ireland reported that 99 per cent of the cannabis consumed in their country comes from South Africa.

It is estimated that 70 per cent of the cannabis entering South Africa was grown in Lesotho, and cannabis is estimated to be Lesotho's third largest source of income. Fields are rarely larger than one hectare, and the plant is grown alongside corn. As in South Africa, small farmers sell their produce to wholesalers, who consolidate the

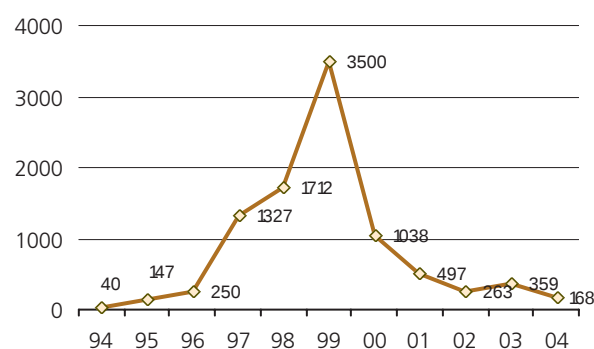
many small inputs for trafficking, and multiple harvests are claimed. All but the main harvest are rather unimpressive, however, with plants remaining rather small.

Swaziland is known for producing high-quality cannabis. The seed stock has been marketed internationally. In 2001, the Swazi police noted cannabis trafficking to the United Kingdom, the United States, the Netherlands, and Japan,²² and this situation does not appear to have changed much more recently. The Swazi authorities eradicated between 400 and 500 hectares annually between 2001 and 2003.

Malawi is also world renowned for the quality of its cannabis. About three to nine tons are seized annually in this small, under-policed country of about 13 million people, suggesting a substantial export market.

Cannabis is also grown for export in West Africa, notably in Nigeria, Ghana, and Senegal. Cannabis is presently cultivated in all 36 states of Nigeria,²³ though the plant was only introduced to the area following World War Two²⁴ "Operation Burn the Weeds" was launched in 1994, and has become the title of Nigeria's ongoing eradication program.²⁵ After a peak in the late 1990s, relatively little area was eradicated in the first years of the 21st Century, contrary to some international reports. Preliminary figures from the 2005 eradication effort suggest that renewed attention is being given to the matter. Cannabis of Nigerian origin is known to be trafficked to other West African countries. Nigeria reported the second largest cannabis herb seizures in Africa (after South Africa) in 2004.

Fig. 3: Hectares of cannabis eradicated in Nigeria



Source: National Drug Law Enforcement Agency, Nigeria.

Ghana has one of the highest known rates of annual cannabis use, with an estimated annual prevalence of 22 per cent in 1998. Ghana's cannabis production has expanded greatly since the 1960s,²⁶ and it has been named as the source of a number of recent major seizures (in excess of one metric ton) of herbal cannabis destined for Belgium and the United Kingdom. The Belgian authorities estimate that 25 per cent of the cannabis trafficked into their country comes from Ghana, and Ghana is listed as a major supplier to Italy, after Albania.

In Senegal, the distribution of cannabis is mostly regional, with Dakar, other urban centres in Senegal, and Gambia being significant outlets.²⁷ Cannabis trafficking has reportedly been a source of funding for the insurgents of the Movement of the Democratic Forces of Casamance (MFDC), though its relative importance has been debated among experts.²⁸ It has been claimed that the Liberian National Patriotic Front for Liberia traded guns for MFDC cannabis.²⁹

There is also documented production of cannabis resin in Senegal, although the extent to which this product is trafficked internationally remains unclear. In 2003, the German police seized 2.7 tons of cannabis resin in a motor home in Hamburg, which they say originated in Senegal and transited Mauritania and Morocco. Its ultimate destination was said to be the Netherlands.³⁰ The country has also been the source of a number of significant seizures of resin of unknown origin destined for Belgium, typically concealed in vehicles such as campers and trucks. Resin has been seized coming into Senegal from both Morocco and Afghanistan, so it is unclear how much of this is locally produced.

In East Africa, fairly large-scale cannabis cultivation occurs in Kenya, primarily in the Lake Victoria basin, in the central highlands around Mt. Kenya and along the coast. As much as 1,500 hectares of cultivation have been estimated in this area, some in the lower farmlands concealed among traditional crops and smaller cultivation in the higher reaches in areas regarded as national wildlife reserve.³¹ Despite two successful, highly publicized targeted raids of 14 farms along Mt. Kenya in 2001 and 2002 that collectively destroyed 461 tons of cannabis, police saw an increase in this crop during targeted raids in 2004.

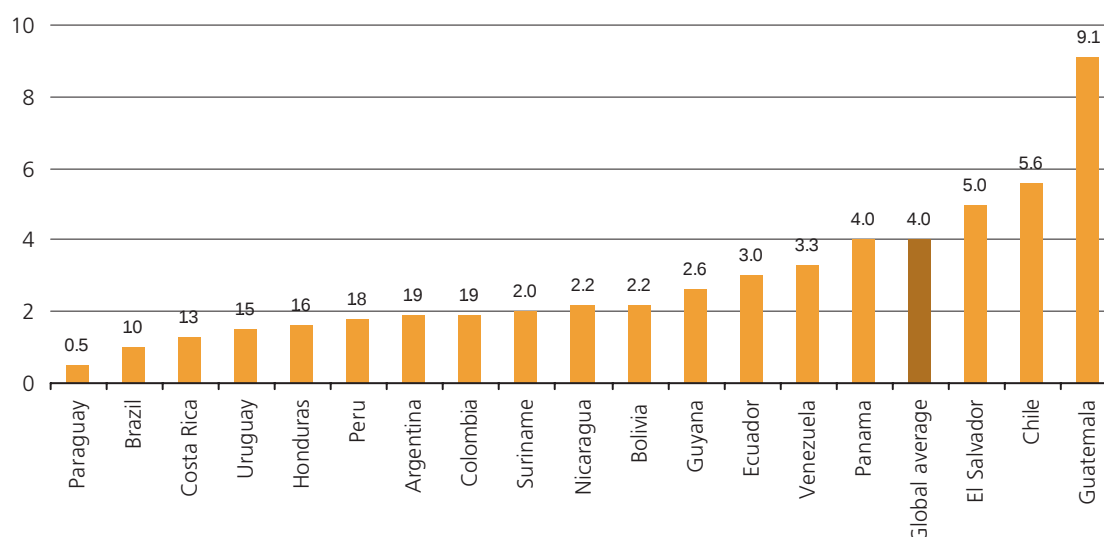
Cannabis is cultivated in ten of the 20 regions of mainland Tanzania, especially in those near the international borders, and police believe that as many as half of the families in these ten regions of the country are involved

in the cultivation of cannabis.³² Seizures have been impressive, though erratic, with an unbelievable haul of 733,222 kilograms in 2003. From January through June 2004 the Tanzanian government destroyed over 230,000 kilograms of cannabis, nearly as much as the annual total in the previous record year, in 2001.³³ According to official reports, 80 per cent of the cannabis in Tanzania is grown domestically, with 20 per cent being imported from Malawi, and 90 per cent of locally produced cannabis is consumed locally.³⁴ This is remarkable because estimates on the prevalence of cannabis use in Tanzania, based on 1999 survey data, are very low (0.2 per cent). It is likely that the user population has grown in the last seven years, since over 5,000 people were arrested for cannabis-related matters in 2003 and over 2,000 people were arrested for dealing cannabis in the first half of 2004 alone.³⁵ Still, the extent of transshipment is probably being underestimated, although the destination of this traffic is unknown.

South and Central America: Too much production, too few users?

South America contains two major exporting countries, one that exports beyond the region (Colombia) and one that exports primarily for regional consumption (Paraguay). South America is unusual in having high levels of seizures and, according to surveys, low levels of domestic use. Only one South American country has reported an annual adult cannabis use level above the global average: Chile (5.3 per cent in 2004).³⁶ Chile is one of the most developed countries with the lowest crime levels in the region, and has one of the lowest levels of seizures. But Brazil (with 1 per cent of the population 12-64 reporting cannabis use in 2001), Colombia (1.9 per cent estimated), Paraguay (0.5 per cent estimated), Argentina (1.9 per cent estimated), and Bolivia (2.2 per cent estimated) all made it to the top 20 nations in terms of the weight of cannabis seized in 2004. If the survey figures are correct, either interdiction rates are extremely high, or much of the cannabis cultivated in the region is exported. With the exception of Colombia, however, none of the nations is known to export cannabis in any great quantity outside the region.

High regional levels of production with low levels of use pose something of a puzzle. For example, only 1 per cent of the population age 12 to 65 in Brazil reported using cannabis in 2001, a total of just over 1 million annual users. But looking just at the amounts seized, nearly 200 metric tons of herbal cannabis were found in the country in 2002, for an average of about 200 grams

Fig. 4: Share of the adult (15-64) population using cannabis annually in South and Central America

Source: UNODC DELTA Database Estimations

seized per user for the year. In addition, almost 2.5 million plants were eradicated that year. If these had been missed, they could have produced another 250 tons, raising the per user production to almost half a kilo apiece. This is more than a joint a day apiece, which is probably more than was actually consumed by these annual users, many of whom use only occasionally. And this is just the amount destroyed, likely a fraction of the total present in the country. Unless interdiction rates are above 50 per cent, these figures suggest an export market, but Brazil is not known to be a major exporter of cannabis. In fact, it is a major importer; officials argue that most of the cannabis consumed in the country comes from Paraguay, with only 20 per cent being produced locally.³⁷

Most Brazilian cannabis is grown in the Northeast of the country, although estimates of the land under cultivation vary widely, from 3,500 hectares to 118,000 hectares. Production is said to involve plantation style operations, utilizing forced labour, with connections to urban organized crime.³⁸ Cannabis grown in Brazil supposedly has a 90-day production cycle, allowing three to four annual harvests in the irrigated areas of the Northeast and three harvests in the rain-fed areas of the North. Farmers are estimated to make as much as US\$ 150 per month (average) by growing cannabis. The price of 1 kg of cannabis at the producer level is less than US\$ 30. This can be sold for approximately US\$ 220 on the streets.³⁹

In a school survey of seven Latin American countries, Paraguay had the second lowest levels of annual cannabis use (1.7 per cent), and cannabis was only the second most popular drug, after *jarra loca* (a mix of wine and tranquilizers)⁴⁰ and its estimated adult use levels are the lowest in Latin America. Yet only Brazil and Colombia claim higher seizures than Paraguay, with about 80 tons seized per year, or about 1.3 kilograms for each of about 60 thousand annual users. Aside from being the primary supplier of Brazil, law enforcement officials in Argentina, Chile and Uruguay all claim that nearly all their cannabis comes from Paraguay. So a lot of the cannabis grown in Paraguay goes out of the country, but it is still surprising that a country with so much production per capita would have so little local consumption.

Paraguay contains an estimated cultivation area about the same as that in Colombia – around 5,500 hectares. In 2004, the Paraguayan government eradicated 753 hectares of this area.⁴¹ In 2005, authorities estimated total land area under cultivation to be 6,000 hectares, producing 15,000 tons of cannabis in two harvests of 3,000 hectares each.⁴² If these estimates are accurate, Paraguay is producing about a third more cannabis than Mexico, and is likely the world's largest producer of herbal cannabis, responsible for a good share of global production. The destination of this massive supply is a mystery, as estimates indicate very small user populations, and Paraguay is not known to export beyond the continent. According to Paraguayan law enforcement

authorities, 85 per cent is destined for the Brazilian market, 10 per cent-15 per cent for other Southern Cone countries, and 2 per cent-3 per cent for local consumption.⁴³ Paraguayan authorities estimate the yield of cannabis crops at an incredible three metric tons per hectare,⁴⁴ attributable in part to the development of a strain of cannabis that can be grown in the dry months of the winter.⁴⁵ Paraguay also produces a form of cannabis resin – *cera Paraguaya* – for export to Argentina and Brazil.

Colombia has long been the region's primary exporter of cannabis. In the 1970s, when Colombian exports to the United States were at their peak, some 30,000 hectares were estimated to be under cannabis. More recently, the United States has estimated that 5,000 hectares have been under cannabis cultivation every year since 1996, with a potential yield of about 4,000 metric tons, of which less than 6 per cent has ever been seized in Colombia.⁴⁶ In 2003, Colombia reported eradicating 20 hectares, and estimated that 2,000 remained for production. Colombia also eradicated some 11,000 cannabis plants in three major cases in 2003.

Chile, the country with the highest per capita use levels in the region, destroyed nearly 80,000 plants in 2003 (about 8 tons of potential cannabis), showing sizeable domestic production, mostly in the centre of the country. The Chilean government estimates local production capacity at about 80 tons, suggesting a 10 per cent eradication rate. Despite this, it estimates that 78 per cent of its supply comes from Paraguay, some 20 per cent of the cannabis consumed locally is of unknown origin, and about 2 per cent is from Peru. Some four tons were seized in 2003, and since Chile is not an obvious trafficking route to anywhere, they were probably intended to be consumed in the country.

While cannabis is cultivated and used in most Central American countries, exports are small and interdiction capacity is limited. In 1995 and 2000, the Inter-American Observatory on Drugs described Central American seizures as 'insignificant'.⁴⁷ But Costa Rica, a country with just over four million citizens, claims to have eradicated about two million plants in 1999, 2000, and 2001, and about one million in 2002 and 2003, enough for 100 to 200 tons of production.⁴⁸

Oceania: The world's highest use levels?

Cannabis grows wild on many of the region's countries and territories, including Australia, Fiji, Federated States of Micronesia, New Zealand, Papua New Guinea, and

Samoa, as well as in American Samoa.⁴⁹ Most countries are self-sufficient in terms of their cannabis supply, and there is little evidence of widespread cross-island trafficking in Oceania today.

In Australia, an estimated 5,000 hectares of cannabis are cultivated in the outdoors,⁵⁰ often on public lands, but the most commonly detected method of cultivation is actually indoors.⁵¹ Almost all cannabis used in the country is locally produced. Cannabis trafficking to Australia has declined greatly in recent years, due in part to law enforcement efforts and in part to growing domestic production, particularly indoor production. In 1996/7, over 24 tons of cannabis were seized at Australia's borders⁵². In contrast, in 2003/4 total seizures of cannabis entering the country amounted to only 15.3 kg, with an average weight of less than 25 grams per detection.⁵³

Most of the cannabis produced in New Zealand is used domestically. Crops are regularly eradicated, destroying about a half a million plants annually.⁵⁴ Most plots are situated in the more remote areas of the North Island. There appears to be a relationship between cannabis cultivation operations and the manufacture of methamphetamine – the New Zealand authorities report locating seven clandestine methamphetamine laboratories during the course of a two-month spraying operation.⁵⁵

In Papua New Guinea, cannabis and annual use levels are believed to be among the highest in the world (30 per cent of those aged 15-64 in 1995, the latest survey available). The country produces Nuigini Gold, a distinct cultivar characterised by its red stem. Nuigini Gold was formerly exported to Australia, but is no longer widely available in that country. In 2002, it was reported that firearms were being traded for the drug, fuelling high level of violence among local communities, but these accounts have more recently been discredited.⁵⁶ In 1998/1999, Papua-New Guinea was the embarkation point for 30 kg of cannabis intercepted by Australian Customs, but by 2003/4, this figure was less than one kilogram.⁵⁷ Cannabis is produced in remote areas of the Highlands where it has to be transported by foot, and much of this cultivation appears to be small scale. Seizure figures have not been provided to UNODC, but reports from other sources also suggest the amounts trafficked are also relatively small.⁵⁸ In the cities, the drug is dealt by 'raskols', urban street gangsters.

In Indonesia, over 200,000 cannabis 'trees' were uprooted by the government in 2004, and 24 tons of

the drug were seized in 2003. Seizures more than tripled in 2004, with almost 85 metric tons. The Indonesian authorities claim that half the local production is consumed domestically, while the other half is exported to Australia, although this conflicts with the Australian claim that most of their cannabis is produced domestically. It has been alleged that the Free Aceh Movement (GAM), an insurgent group, was funding itself in part through cannabis trafficking. The Indonesian police report recently seizing over 40 tons of cannabis and arresting a number of GAM members guarding the production areas. As in other areas where insurgencies are allegedly involved in cannabis, the GAM allegedly levies a tax on rural production, which is controlled by Jakarta-based trafficking organizations.⁵⁹

Cannabis cultivation in the Philippines appears to have grown dramatically in the last three decades, from just nine identified plantations to 107 in 2005.⁶⁰ In the Philippines in 2004, using manual eradication, the government destroyed 2.4 million cannabis plants and seedlings.⁶¹ The Communist New People's Army is said to provide protection to growers in the northern areas exchange for a 'revolutionary tax'. The Abu Sayyaf Group (ASG) also collects protection money and controls a thriving cannabis production site in Basilan. Most of the cannabis produced in the Philippines is for local use, with the remainder supposedly smuggled to Australia, Japan, Malaysia, Taiwan Province of China, and Europe.⁶²

Europe: A changing market

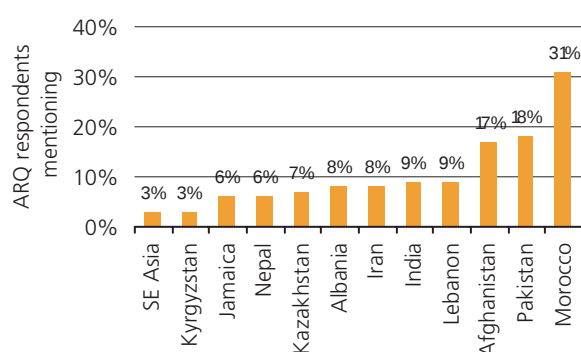
Cannabis use has increased substantially in almost every country in Europe over the last 10 years, and Europe currently accounts for about 20 per cent of global cannabis use. While Europe cannabis use is often associated with cannabis resin, it does possess a substantial and growing herbal market. Indeed, in Austria, Belgium, Czech Republic, Estonia, and Netherlands, the market for herbal cannabis is estimated to exceed that of cannabis resin.⁶³ If estimates about the growing market share commanded by home grown product in the United Kingdom are accurate, then its herbal market may also be larger. And while it is believed that cannabis resin is still most popular in Germany, the margin is small and may be growing smaller. In countries where herbal cannabis represents a cheaper source of THC than resin, resin may be facing a declining market share.

Over half the cannabis resin seized in the world in 2004 was seized in Spain (794 tons out of 1,470 tons seized) and 100 per cent of the cannabis resin seized in Spain is believed to originate in Morocco. Adding in the rest of

West and Central Europe accounts for 74 per cent of the global total, and another 86 tons were seized at source in Morocco. Thus, the Western Europe/Morocco resin market is responsible for about 80 per cent of global resin seizures.

Morocco is said to be the source of all the resin consumed in Spain and Portugal, and most of that consumed in France (82 per cent), Belgium (80 per cent), Sweden (85 per cent), and the Czech Republic (70 per cent). Much of the cannabis resin transits Spain and the Netherlands before being shipped to other countries. The remainder of the resin supply originates in Afghanistan/Pakistan, Central Asia or from within Europe (mainly Albania).

Fig. 5: Countries and regions identified as source of cannabis resin



Source: Annual Reports Questionnaire data.

In Germany, the bulk of seized cannabis products entering the country in 2003 came from two sources (both about 3.5 tons, out of 8.6 tons imported): relatively small shipments (of an average weight of about 2 kg) from the Netherlands and massive shipments (averaging about 1 ton) directly from Morocco. Spain was also a significant supplier (just under a ton) of medium sized shipments (averaging 15 kg). In 2004, the size of the Moroccan shipments dropped drastically (to an average of 64 kg), and the Netherlands became clearly the leading source, responsible for half of the volume and 78 per cent of the cases.⁶⁴

The Netherlands has long been an epicentre of cannabis cultivation in Europe and beyond. Many countries or areas indicate that the Netherlands is a significant source of the herbal cannabis entering their countries, either as an origin or a transit country, including Austria, Belarus, Belgium (25 per cent of all cannabis in the

country is estimated to be Dutch), Czech Republic (50 per cent), Estonia (20 per cent), France, Germany, Hong Kong Special Administrative Region of China, Hungary (50 per cent), Iceland, Ireland, Italy (17 per cent), Latvia (50 per cent), Lithuania (75 per cent) Luxembourg, Poland, Spain, Sweden, Switzerland, and the United States. In addition, several other countries identify the Netherlands as a transit zone for resin entering their countries. The role of the Netherlands in the global production of high-potency cannabis is discussed below.

Belgian authorities report 90 per cent of the cannabis produced in their country is for export, and that cultivation areas are found mostly along the border with the Netherlands. Despite this, small-scale production for personal use appears to be on the increase. Some 70 per cent of the cultivation operations detected in 2003 involved less than six plants.⁶⁵ Belgian and Dutch groups are said to “control” indoor production in France.

In Eastern Europe, Albania remains a major exporter of herbal cannabis, where mass production began in the southern parts of the country in the early 1990s.⁶⁶ Herbal cannabis is said to be trafficked by road from Albania through the former Yugoslav Republic of Macedonia and Bulgaria to Turkey.⁶⁷ Albanian cannabis also feeds the markets of Austria, Bosnia and Herzegovina, Bulgaria (45 per cent), Croatia (30 per cent), Greece, Italy (77.4 per cent), Serbia and Montenegro (50 per cent), Slovenia, the Former Yugoslav Republic of Macedonia and Sweden.⁶⁸ Cannabis production in the southern areas of Albania is believed to be destined almost exclusively for export to Italy.⁶⁹

In addition to receiving imports from Albania, cannabis is also cultivated domestically in Greece and Italy. Some 200,000 cannabis plants were eradicated by the Italian authorities in 2003. Greek authorities uprooted 21,000 plants in 2003, about 40 per cent of which were found on Crete. The growth in Albanian cannabis production is believed to be linked in part to the Greek crackdown on cannabis cultivation in some areas of the country.⁷⁰

In Bulgaria, cannabis is grown in the Southwest and in the North/ Northwest. Many of the growers are elderly, paid by people linked to organized crime. Production on public lands is also reported.⁷¹ About half the herbal cannabis trafficked in Bulgaria is domestic, while most of the balance is Albanian, and this produce may be trafficked on to Turkey and Greece. Some 12 tons of cannabis plants were destroyed in eradication operations

in 2003 in a relatively small number of operations (31), suggesting large-scale cultivation.

About 20 per cent of herbal cannabis trafficked in Croatia is domestic, with the balance being imported from Bosnia (about half), Serbia, Montenegro, and other areas. About half of this remains in the country, while the rest is trafficked to Western Europe. All domestically produced cannabis is consumed in the country, however.

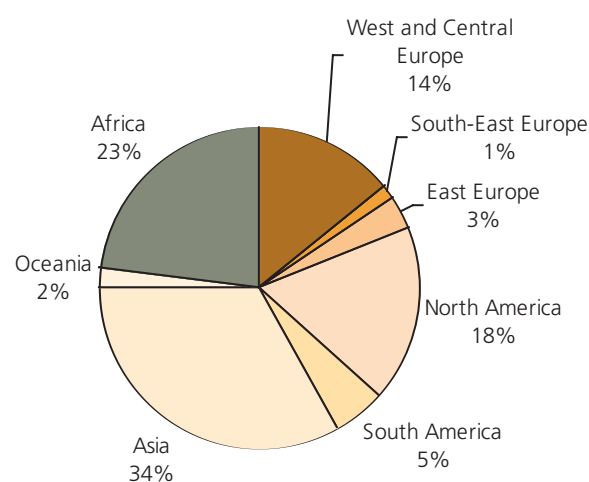
Polish authorities report cultivation of cannabis in Central, Southeastern, and Western Poland, in cereal fields, by forest roads, in gardens, and in greenhouses. In 2003, they eradicated over six hectares of cultivated area, and seized 32 indoor operations. They estimate about 45 per cent of local produce is destined for export, mainly to the Netherlands and Germany.

As discussed further below, the United Kingdom seems to be undergoing a transition from reliance on imported herbal cannabis and resin to locally produced herbal cannabis. Despite this, large amounts of cannabis are still imported into the UK. A recent example is the seizure of five tons of cannabis from Mexico hidden in a containerised shipment in October 2005.⁷²

Asia: Home to a third of global cannabis users

Asia as a whole has the lowest per capita rate of cannabis use of any major region in the world (2.2 per cent) but sheer population size means that it is home to the largest

Fig. 6: Regional shares of global cannabis users



Sources: UNODC, Annual Reports Questionnaire Data, Govt. reports, reports of regional bodies, UNODC estimates.

number of users, some 34 per cent of the estimated global total.

Central Asia, in particular the countries of Kazakhstan and Kyrgyzstan, contain what appears to be the largest cannabis fields in the world. In Kazakhstan's Chui valley alone, as much as 400,000 hectares of cannabis grow wild, with a potential output of 6,000 tons, but an estimated harvest of only 500 tons.⁷³ This wild cannabis has an unusually high THC content, up to 4 per cent,⁷⁴ making it viable for low-end international sale, and good stock for cannabis resin production. The consensus is, however, that most of this cannabis is consumed in the region, and that its value does not merit long-range trafficking across multiple borders.⁷⁵ Thus, while the productive potential of this area remains immense, it is likely to remain unrealised unless circumstances change.

The Kyrgyz authorities have estimated cultivation at about 6,000 hectares since 2001. In the Kyrgyzstan districts surveyed by UNODC, approximately 3,005 hectares of cannabis were identified. More than 70 per cent of the cannabis found was either on abandoned farmland or on land being used for agricultural purposes.⁷⁶

Russian authorities say 70 per cent of the herbal cannabis consumed in their country is locally produced, with another 15 per cent coming from Kazakhstan and Ukraine, and 15 per cent from Kyrgyzstan and Moldova.⁷⁷ In some areas, such as South-East Asia and the Caucasus region, the demand for cannabis products is still almost entirely satisfied by local production.⁷⁸ Authorities estimate 63 per cent of domestic cannabis cultivation occurs in the oblast of Kursk, with 13 per cent occurring in the Moscow region.⁷⁹

The second largest market for cannabis resin is the Near and Middle East/Southwest Asia region. This region is mainly supplied from cannabis resin produced in Afghanistan and Pakistan and, to a lesser degree, from cannabis resin originating in Lebanon. Some of the cannabis resin from Afghanistan/Pakistan is also being shipped to Canada and to countries in Eastern Africa.

Afghanistan has long been a centre of cannabis resin production, both for regional use and for being trafficked to Europe. While today Afghanistan commands only a minority share of Europe's resin market, production remains considerable. Cannabis is grown like a hedge around opium poppy plots, with the same farmers cultivating both drugs.

The Afghan authorities report the area under cannabis cultivation in 2003 to be 52,000 hectares, compared to 80,000 hectares of opium poppy in that year. Each hectare is said to produce 85 kg of resin a year. Estimated total resin production was thus 4420 tons according to the Afghan authorities. In contrast, research by UNODC in connection with the annual opium survey suggested a cultivation area of about 30,000 hectares. Cannabis production was reported to take place in most provinces of Afghanistan.

In 2003, there were more people arrested for cannabis trafficking (62) than for heroin trafficking (41) in Afghanistan. Cannabis seizures were exclusively in the form of cannabis resin (81.2 tons). Cannabis resin trafficking was reported to have increased, mainly going to central Pakistan as well as to the Islamic Republic of Iran, Tajikistan and Turkmenistan. The Afghan government reports that 5 per cent of the cannabis is locally used, and the rest is for export.

Most of cannabis processing is reported to take place in the border regions with Pakistan.⁸⁰ It is thus difficult to disentangle Afghan and Pakistani cannabis products, and while it is widely believed that cannabis is produced throughout Pakistan, it would appear that the bulk of the cultivation occurs on the Afghan side of the border.

Turkey reports about half of the resin trafficked into the country comes from Lebanon, with 27 per cent coming from Syria, and 18 per cent coming from Iran. Lesser amounts are also said to come from Jordan. But, in 2003, the Syrian and Jordanian authorities said that all the cannabis resin in their countries came from Lebanon.

Lebanon was once the world's leading producer of cannabis resin. In the late 1980s, cannabis cultivation was estimated to be as high as 11,000 to 16,000 hectares, yielding up to 1,000 tons of cannabis resin. From 1991 to 1993, Lebanese and Syrian forces eradicated illicit cultivation in the Bekaa Valley. Despite this, 40 tons were still seized in 1994.⁸¹ In 2002, it was again estimated that over 11,000 hectares were under cultivation, dropping to 727 hectares in 2003. In 2004, a reported 16,000 hectares were eradicated. The Lebanese authorities assert that 98.8 per cent of the cannabis resin produced in the country is also used there, with a small share being exported to Bulgaria and Dubai, United Arab Emirates. Most production today occurs in the Bekaa Valley, in the areas of Baalbek and Hermel.

The Syrian authorities say 100 per cent of the cannabis resin trafficked in their country comes from Lebanon,

and 95 per cent of it is headed for the Gulf States, with 5 per cent being destined for Turkey. They assert there is no drug production in Syria.

In South Asia, cannabis is also cultivated in India, especially in the Kullu Valley in Himachal Pradesh. In addition, cannabis is grown in Andhra Pradesh, Uttar Pradesh, Tamil Nadu, Kerala, and Manipur states, as well as in remote areas of Jammu and Kashmir. In 2004, the Indian government eradicated 214 hectares of cannabis. Seizures of 144 metric tons were reported in 2004. In addition to local production, cannabis resin ('charas') is imported from Afghanistan, Pakistan, and Nepal. It is smuggled into India from Nepal across the land border in the states of Bihar and Uttar Pradesh, from where it finds its way to Delhi and Mumbai.⁸²

India is a major cannabis consumer country. In 2004, UNODC and the Indian Ministry of Social Justice and Empowerment, jointly released the National Survey on the Extent, Pattern and Trends of Drug Abuse in India, the first of its kind. It showed that 2.3 million Indians were dependent on cannabis.⁸³

In Nepal, cannabis is cultivated in the southern parts of the country and grows wild through much of the north. Nepalese cannabis resin is trafficked around the world, with seizures made in the United Kingdom, Denmark, New Zealand, Hong Kong Special Administrative Region of China, and Canada. There have been claims that Maoist revolutionary groups are using cannabis to fund their insurgency. Maoists are known to have called upon locals in the Birgunj area to increase cannabis production. The Nepalese authorities report that the Maoists levy a 40 per cent tax on cannabis production in certain areas.⁸⁴ There is evidence that the Maoist insurgents both charge a levy on cannabis resin passing through territory they control and operate a system whereby growers are authorized to cultivate a certain hectareage per year for the payment of a fee.⁸⁵

In Southeast Asia, herbal cannabis also continues to be cultivated in and smuggled out of Cambodia, Indonesia, Lao People's Democratic Republic, Myanmar and Thailand. Some 14 hectares of cannabis were eradicated in Cambodia in 2004, and production is said to be as much as 1,000 tons. Much of the production occurs in Cambodia's northwest provinces and is reputed to be "contract cultivation" with Cambodians operating with the financial help, and under the control or influence of foreign (especially Thai) criminal syndicates.

A similar phenomenon is seen in Lao People's Democratic Republic (PDR), where low-grade cannabis pro-

duction is largely in the lowlands, in the southern Lao PDR and in particular in areas near to the Mekong River. Most of this is for export to Thailand, undertaken on contract for Thai organized crime groups, who advance money and consolidate production in Thailand, Cambodia, and Lao PDR.⁸⁶

Some of this produce is transhipped through Viet Nam, confusing its source of origin, while cultivation in Viet Nam is said to be 'insignificant'.⁸⁷ Viet Nam, however, had a long tradition of cannabis cultivation and was once the source of potent cannabis for export to the US market.

The 2005 drug abuse surveillance data has shown that cannabis use has been increasing across China, with high levels of use in Xinjiang, Hubei and Guangdong provinces.⁸⁸ Eradication campaigns have been carried out in the Yunnan province and the autonomous Uighur region. In Hong Kong Special Administrative Region of China, herbal cannabis is imported from the Golden Triangle, Cambodia, and the Netherlands, often via South Africa, Dubai, or Thailand, whereas resin is imported from South Asia.

As the discussion above indicates, the state of our knowledge on the extent of global cannabis production is far from perfect. In many regions, it is difficult to reconcile production estimates with what is known about local consumption and trafficking. For example, in both Latin America and Africa, large seizures are made in countries with low reported use levels that are not known to export cannabis. It is unclear where this drug is coming from and where it is going. Even in the United States, a country with a regular household survey on drug use, a large eradication programme, and well-developed criminal intelligence, recent official estimates of the extent of domestic cultivation vary by more than a factor of six. These difficulties are necessarily reflected in any attempt to estimate of the scope of global production.

A global market that defies efforts to size it up

The above makes clear that cannabis is widespread, but determining how much is produced is another matter entirely. There are two broad approaches that could be taken. One is to start with information on extent of production (supply-side), such as estimates of the extent of cultivation and crop yields, or seizure figures. The second is to estimate how much is consumed (demand-side), though user survey data and research on how much of the drug is typically consumed to produce the desired effect. The problem is that these two approaches

typically produce very different results, as highlighted in the discussion that follows.

How much is produced?

The Annual Reports Questionnaire (ARQ) sent every year by UNODC requires Member States to provide estimates of the number of hectares under cultivation in their respective countries, but most do not fill out this section. In fairness, most states would have little knowledge of how to make such an estimate. This leaves one with little information on which to base a supply-side calculation of total global production.

Combining the information available about the biggest markets with seizure data may help to come up with some idea of the number of hectares under cannabis cultivation, at least for those markets for which reliable estimates exist. The table below lays out the top producers about which information is available. Together, these nations are responsible for at least 78 per cent of global cannabis seizures.⁸⁹

This approach suggests that the bulk of global cannabis production could occur in an area of about 231,000 hectares, of which more than half are in Morocco. This is a small area, about the size of the Comoros. Of this, about 10 per cent gets eradicated. The estimated seizure rate for these big producers is about 17 per cent, includ-

ing seizures made by destination countries. In other words, after eradication, four-fifths of the remaining cannabis gets past law enforcement.

This rate of interdiction refers to some of the most developed markets in the world, and it is likely that the corresponding figure in places like Africa is much less. Application of this rate should therefore be considered a low-end estimate. Global cannabis seizures in 2004 were 6,264 tons of herbal and 1,470 tons of resin (about 37,000 tons of herbal equivalent) for some 43,000 tons of global cannabis production seized. If this is about a fifth of true production, about 215,000 tons were produced in 2004. However, most of this (85 per cent) was reduced to resin. Total cannabis product output should thus be over 30,000 tons of cannabis herb and more than 7,000 tons of resin.

How much is consumed?

Another way of estimating global production is to look at global consumption. To come up with demand-side estimates of total cannabis production, three things need to be known:

1. What share of the global population consumes cannabis annually?
2. How many days a year do they consume it?
3. How much do they consume on the days when they use the drug?

Table 1: 2003 Cannabis production estimates for major producers

	Estimated hectares under cultivation	Hectares eradicated	Estimated production in herbal equivalents ⁹⁰ (tons)	Total seizures in herbal equivalents (tons) ^a
Morocco	134,000	---	98,000	21,000 ^b
Afghanistan	52,000	---	50,000	6432 ^c
Mexico	29,500	22,000	10,400	2160
United States	4500	365 ^d	4455	1224
Paraguay	5,500	753	15,000	257 ^e
Colombia	5,000	0	4,000	134
TOTAL	231,000	23,118	181,885	31,207

Figures in parenthesis are estimates based on other data; resin data are converted into "herbal equivalent" by multiplying by 25

a Assumes a 4 per cent yield.

b Assumes Morocco is responsible for 80 per cent of resin seizures in Spain, France, UK, Portugal, Italy, Germany, Belgium, Ireland, Denmark, Norway, and Sweden.

c Assumes Afghanistan is responsible for 100 per cent of resin seizures in Pakistan (as per ARQ) and Iran - the Afghan contribution to European resin is not included.

d Total plants converted to 1 plant per square metre outdoor equivalents.

e Assumes Paraguay is responsible for 80 per cent of herbal seizures in Brazil and Argentina.

One key issue in trying to determine the amount of cannabis required to meet global demand (in metric tons) is that not all cannabis is created equal. Cannabis resin and sinsemilla (the potent flowering tops of the unfertilised female plant – see Annex 1) are concentrated forms of the drug, and users use less of these drugs (in terms of weight) than they would of low-grade product. In order to relate demand to production, the markets for these products would ideally be calculated separately.

What share of the global population consumes cannabis annually? Answering this question requires some extrapolation, as there are massive gaps in the survey data. The traditional approach is to use sub-regional averages to calculate use levels for those countries for which data are lacking. It is also possible to extend data from a limited sub-sample of the population (the most obvious example being school surveys) to the population as a whole on the basis of ratios determined from countries where both sets of data exist.

All this is hinged on the survey data. There has been considerable debate about the veracity of self-reporting on matters involving criminal activity,⁹¹ and the level of inaccuracy may vary considerably— in areas where drug use is highly stigmatized, subjects may be unwilling to report use, even if confidentiality is assured.

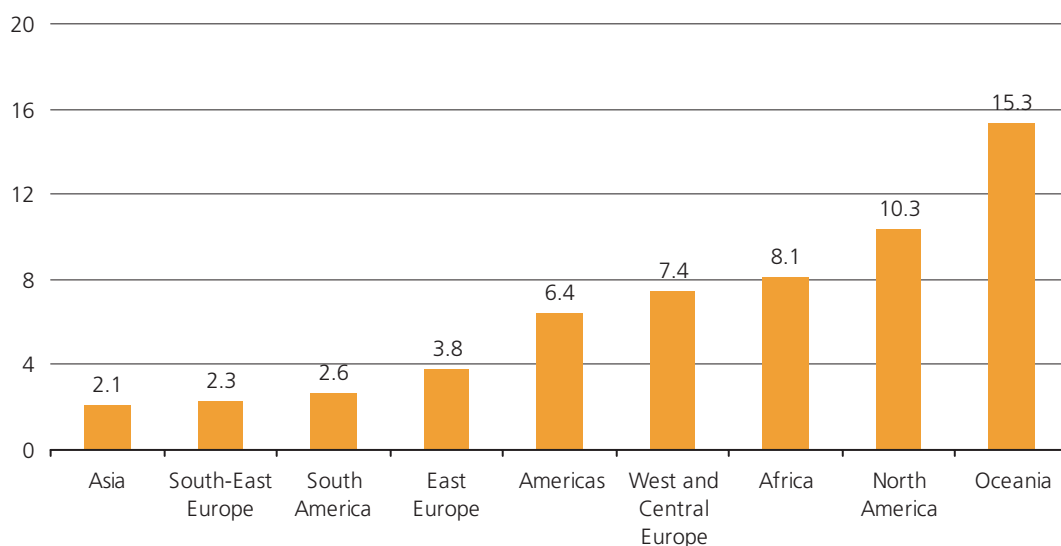
An additional complication lies in the fact that surveys on cannabis use generally do not distinguish between

herbal and resin use. From the perspective of reconciling use data with figures on cultivation, this is a major problem, since production of cannabis resin requires a much greater land area. However, since resin potency and herbal potency are approaching parity in Europe, the largest market for resin, it is probably fair to assume the rate at which users consume resin is about the same as the rate at which they consume herbal cannabis, and this is all that matters for a demand side estimate.

The UNODC estimate of global annual adult prevalence for cannabis use is 4 per cent, or about 162 million people. Use rates vary substantially by region, but for the rough estimate made here, regional differences in consumption patterns are not taken into account.

Of course, these 162 million people did not all use cannabis at the same rate. Some of them may have experimented with the drug once or twice, while others consume the drug on a daily basis. It is estimated that 10 per cent of people who try cannabis will progress to daily use for some period of their lives, with a further 20 per cent to 30 per cent using on a weekly basis.⁹² This leaves, however, a large share of people whose use is less frequent. The prevalence of use tends to vary depending on the life-stage of the user. For example, about 60 per cent of French 19-year-old boys have tried cannabis, and, of these, more than one in three uses 20 times a month or more. This share drops greatly in later life stages.⁹³

Fig. 7: Regional annual prevalence rates



Sources: UNODC, Annual Reports Questionnaire Data, Government reports, reports of regional bodies, UNODC estimates.

Sources from a wide range of countries suggest that about 14 per cent of annual cannabis users are daily users, a higher figure than many would expect. If these figures could be generalized to the total global population, this suggests that about 22.5 million people use cannabis daily or near-daily, with the other 138.5 million using it less often. This figure is important because only at the level of daily or near-daily use does tolerance develop, and this has an impact on the amount of cannabis used. Of daily users, about a third are chronically intoxicated. For more details on this breakdown, see Annex 3.

One can estimate that of the 162 million people who use cannabis each year, about 75 million could be classed 'casual' (using less than once a month), 66 million could be classed 'regular' (more than monthly but less than daily), 15 million 'daily', and 7 million 'chronic' (continually intoxicated) users. These groups can be expected to consume at different rates.

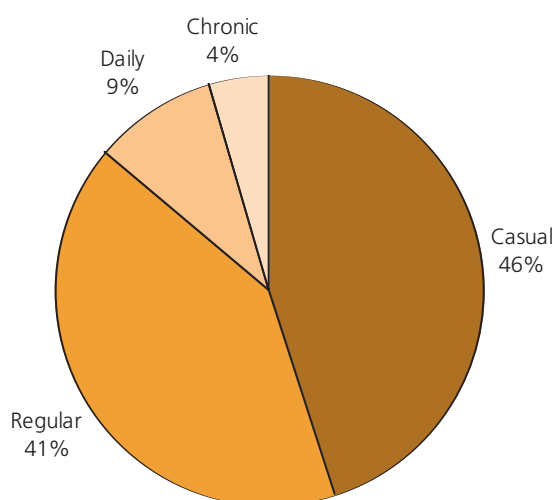
Casual users are unlikely to finish a joint by themselves in any of the one to 11 sessions of use in the year (for more on cannabis dosage, see Annex 3). More likely, these users had two to three hits off a 0.5 gram joint shared by three or four people, representing about 0.15 grams of cannabis consumption per usage session. The distribution curve for less than 12 times per year users is heavily skewed towards one to three sessions of use according to the US data, and a weighted average of this

category is about four sessions per year. Thus 75 million people would smoke an average of 0.15 grams of cannabis an average of four times a year, for a total of 45 tons of total consumption.

While regular users, who do not consume cannabis on a near-daily basis, are not likely to build up much of a tolerance, they are more likely to consume the drug alone, or more than once in a single day of use. On the other hand, they are also more likely to prefer premium cannabis (which may be up to 10 times stronger) and to have better inhalation technique (which can increase THC absorption four fold), both of which would mean that they would require less cannabis to get high than casual users. If it is assumed that these factors cancel each other out somewhat, the average use level of about 0.15 grams per day of use can be maintained. The distribution of responses in the US is also skewed toward the lower end in this group, with a weighted average of about 100 days of use. These 66 million people would thus smoke an average of 0.15 grams an average of 100 times a year, for a total of 990 metric tons of consumption.

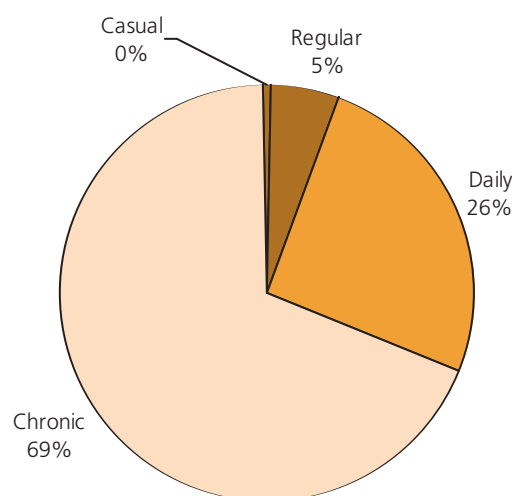
Daily users, according to most sources, consume between one and four joints a day. The weighted average in this category, based on the American data, is about 320 days of use. Thus, 15 million people smoked an average of one gram of cannabis a day for 320 days a year, for a total of 4,800 metric tons of consumption in 2004.

Fig. 8: Breakdown of annual cannabis users by frequency of use



Sources: UNODC, Annual Reports Questionnaire Data, Government reports, reports of regional bodies, UNODC estimates.

Fig. 9: Shares of total cannabis consumption by frequency of use



Sources: UNODC, Annual Reports Questionnaire Data, Government reports, reports of regional bodies, UNODC estimates.

Chronic users can consume huge amounts of the drug. Use patterns vary so widely that it is impossible to come up with an average, but using medical cannabis guidelines and field reports, it appears that about ten joints, or five grams, of cannabis is a reasonable level for fairly constant intoxication. These seven million users consume every day, so their total consumption should be about 12,775 metric tons.

This estimate supports the oft-made assumption that a core of ‘heavy’ users consume the bulk of the cannabis produced. The 22 million people (13.5 per cent of all users) who use the drug every day consume 95 per cent of the drug and of those, 7 million (4 per cent) who smoke it constantly consume 69 per cent.

Can supply and demand-side estimates be reconciled?

Supply and demand side estimates have proven difficult to reconcile for a range of analysts. The 2006 *World Drug Report* estimates global cannabis production at about 45,000 tons, and the global consumer base at 162 million people annually. Dividing the one quantity by the other results in about 277 grams per user, or over a quarter of a kilo apiece. If we use a figure of 0.5 g of cannabis per joint (see Annex 1), 277 grams therefore equals 554 joints per year, or more than one and a half per day per user. Taking the example of the US market, with a price of \$10 a gram, each user would spend \$2,770 on cannabis in one year. With a US national average per capita income of about \$35,750, this expenditure would represent 8 per cent of pre-tax income of every American who smoked cannabis last year. Although the bulk of this is consumed by a highly dedicated cadre of daily and chronic users, many of whom must have access to a free supply of cannabis, this still seems impossibly high.

Two possibilities may be considered:

- The amount of production is being overestimated, or
- The number of users is being underestimated.

Just over 6,000 tons of cannabis were seized in 2004, which would mean that about 15 per cent of total estimated global production is seized. A seizure rate of more than 15 per cent seems unlikely, given that the ratio of estimated Mexican production to seizures is just over 20 per cent (2,000 of 10,000 tons), and it is unlikely that less well resourced regions (such as much of Africa) would perform better. This is particularly true given recent trends towards smaller-scale indoor production within developed countries and production for personal

use. Thus, it is unlikely that production is being significantly overestimated.

The estimated number of annual users – at nearly 4 per cent of the global population 15-64 – is already very high. Even doubling this rate would only halve the average consumption per annual user to 110 g, which is still over \$1,000 a year per user in the US. Doubling US annual use estimates would also mean more than a quarter (26 per cent) of all Americans 15-64 spent this amount of money on an illegal drug last year.

The problem may lie with the seizure figures, rather than the production figures. Since it is unlikely that all seizures are weighed, and it is likely that eradicated crops are added into the total in some cases, an element of estimation exists in generating seizure figures. In theory, the entire cannabis plant could be used for psychoactive purposes – in practice, increasing demand for quality in today’s market means that user-ready sales are often of the flowering tops only. Thus, seizure estimates may be dealing with a lot of bulk that would never translate into saleable street product. If seizure amounts were scaled down, production figures could also be adjusted without exaggerating the interception rate.

Turning to the figures generated for this chapter, demand side estimates place global production at 19,000 tons per year. But this is 19,000 tons of cleaned product, not 19,000 tons of the product as it is generally sold. On the supply side, an estimated 231,000 hectares are under cultivation, but the majority of these are dedicated to cannabis resin. An estimated 30,000 tons of cannabis herb and just under 7,000 tons of resin are produced, of which 6,264 tons of herbal and 1,470 tons of resin were seized in 2004, leaving about 24,000 tons of herbal and 5,500 tons of resin for consumers. The difference of 5,000 tons between the two estimates on cannabis herb (24,000 tons for the production side estimate and 19,000 tons for the demand side estimate) may be attributable to the distinction between cannabis as sold and cannabis as used.

Unfortunately, given the paucity of the data, the arguments above cannot move beyond the hypothetical. Too little is known about how and where cannabis is being grown. Each year a growing number of people consume the drug, but the source of their supply and the extent of their use remain obscure. This state of ignorance is particularly unsatisfactory given emerging information about the dangers of cannabis use. Cannabis is changing in alarming ways, and, at present, the international community lacks the capacity to apply more than rough estimates to the scope of the problem.