



UNODC

United Nations Office on Drugs and Crime



Government of Afghanistan
Ministry of Counter Narcotics



Afghanistan

Cannabis survey 2010

June 2011

ABBREVIATIONS

ANDS	Afghanistan National Development Strategy
AOPS	Annual Opium Poppy Survey
CNPA	Counter Narcotics Police of Afghanistan
ICMP	Illicit Crop Monitoring Programme (UNODC)
MCN	Ministry of Counter-Narcotics
NDCS	National Drug Control Strategy
UNODC	United Nations Office on Drugs and Crime

ACKNOWLEDGEMENTS

The following organizations and individuals contributed to the implementation of the 2010 Afghanistan Cannabis Survey and to the preparation of this report:

Ministry of Counter-Narcotics:

Mohammad Ibrahim Azhar (Deputy Minister), Haroon Rashid Sherzad (Director General), Policy & Coordination, Mir Abdullah (Director of Survey and Monitoring Directorate), Saraj Ahmad (Deputy Director of Survey and Monitoring Directorate).

Survey Coordinators: Eshaq Masumi (Central Region), Abdul Mateen (Eastern Region), Abdul Latif Ehsan (Western Region), Fida Mohammad (Northern Region), Mohammed Ishaq Anderabi (North-Eastern Region), Khalil Ahmad (Southern Region), Khiali Jan Mangal (Eradication Verification Reporter), Sayed Najibullah Ahmadi (Economic specialist), Mohammad Khyber Wardak (Database officer), Mohammad Sadiq Rizaee (Remote Sensing), Shiraz Khan Hadawe (GIS & Remote Sensing Analyst), Mohammad Ajmal (Data entry), Sahar (Data entry), Mohammad Hakim Hayat (Data entry).

United Nations Office on Drugs and Crime (Kabul):

Jean-Luc Lemahieu (Country Representative), Ashita Mittal (Deputy Representative, Programme), Devashish Dhar (International Project Coordinator), Ziauddin Zaki (National Project Coordinator), Abdul Mannan Ahmadzai (Survey Officer), Noor Mohammad Sadiq (Database Developer)

Remote sensing analysts: Ahmad Jawid Ghiasee and Sayed Sadat Mehdi

Eradication reporters: Ramin Sobhi and Zia Ulhaq Sidiqi

Survey Coordinators: Abdul Basir Basiret (Eastern Region), Abdul Jalil (Northern Region), Sayed Ahmad (Southern Region), Fawad Ahmad Alaie (Western Region), Mohammad Rafi (North-eastern Region), Rahimullah Omar (Central Region),

Provincial Coordinators: Fazal Mohammad Fazli (Southern Region), Mohammad Alam Ghalib Eastern Region), Altaf Hussain Joya (Western Region), Lutfurhaman Lutfi (Northern Region).

United Nations Office on Drugs and Crime (Vienna):

Sandeep Chawla (Director, Division for Policy Analysis and Public Affairs), Angela Me (Chief, Statistics and Surveys Section-SASS), Martin Raithelhuber (Programme Officer), Philip Davis (Statistician), Coen Bussink (GIS & Remote Sensing Expert), Dorien Braam (Consultant) (all SASS), Suzanne Kunnen (Public Information Assistant, Studies and Threat Analysis Section).

The implementation of the survey would not have been possible without the dedicated work of the field surveyors, who often faced difficult security conditions.

The Afghanistan Cannabis Survey 2010 was financed by the United States of America. The MCN/UNODC Illicit Crop Monitoring activities in Afghanistan were made possible by financial contributions from the Governments of Germany, Norway, the United Kingdom and the United States of America.

This report has not been formally edited.

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Fact Sheet Afghanistan Cannabis Survey 2010

	2009	Change on 2009	2010
Cannabis cultivation ¹	10,000 – 24,000 ha	*	9,000 – 29,000 ha
No. of provinces with cannabis cultivation	17	+2	19
Average cannabis resin powder (garda) yield from cannabis in mono-crop cultivation	1 st garda: 68 kg/ha 2 nd garda: 46 kg/ha 3 rd garda: 30 kg/ha Total: 145 kg/ha	-12%	1 st garda: 63 kg/ha 2 nd garda: 41 kg/ha 3 rd garda: 24 kg/ha Total: 128 kg/ha
Potential cannabis resin powder (garda) production	1,500 – 3,500 mt	*	1,200 – 3,700 mt
Cannabis-growing households	40,000 (25,000 - 60,000)	+18%	47,000 (27,000 - 88,000)
Average cannabis cultivated per cannabis growing-household	0.4 ha		0.33 ha
Average opium poppy cultivated per opium-growing household	0.5 ha		0.49 ha
Proportion of cannabis farmers who also grew opium	67%		61%
Average farm-gate prices of cannabis resin at the time of resin processing (January), weighted by production ²	1 st garda: US\$ 35/kg 2 nd garda: US\$ 24/kg 3 rd garda: US\$ 12/kg	+146% +175% +225%	1 st garda: US\$ 86/kg 2 nd garda: US\$ 66/kg 3 rd garda: US\$ 39/kg
Total farm-gate value of cannabis resin production (all garda qualities)	US\$ 39 – 94 million	*	US\$ 85 – 263 million
As % of GDP ³	0.4% - 0.9%		0.7% - 2.0%
Average yearly gross income from cannabis of cannabis-growing households	US\$ 1,553	+93%	US\$ 3,000
Average yearly gross income from opium of opium-growing households	US\$ 1,786	+36%	US\$ 2,433
Income from cannabis per ha (gross/net)**	US\$ 3,900 / 3,341	+131%/+150%	US\$ 9,000 / 8,341
Income from opium per ha (gross/net)**	US\$ 3,600 / 2,005	+36%/+45%	US\$ 4,900 / 2,900
Income from wheat per ha (gross/net)**	US\$ 1,200 / 960	-36%/-38%	US\$ 770 / 600

* Due to the uncertainty associated with the estimate, a change rate could not be calculated.

** Income figures are indicative only as they do not include all expenditure and income components associated with cultivation.

¹ Cannabis cultivation was defined as mono-crop cannabis cultivated in fields in the cannabis risk area (22 of the 34 provinces of Afghanistan). Small-scale and mixed cultivation could not be considered.

² In 2009, the simple average price of cannabis garda was reported. However, in line with other reports and to improve comparability, the average price weighted by production is presented here for both years.

³ Nominal GDP of the respective year. Source: Gov. of Afghanistan, Central Statistical Office.

EXECUTIVE SUMMARY

This 2010 Afghanistan Cannabis Survey updates the first-ever Afghanistan Cannabis Survey that was produced in 2009 by the UNODC and the Ministry of Counter Narcotics (MCN). Based on years of evidence from cannabis seizures that pointed to Afghanistan as a main cannabis producer, the 2009 survey was the initial effort to systemically estimate cannabis cultivation and production in the country. The findings confirmed Afghanistan's role as a major grower of cannabis, but also discovered that the country produced more cannabis resin or hashish than any other nation. The reason why was found to be the country's high yields, up to 145 kg of resin per hectare as compared to Morocco's 40 kg per hectare.

The 2010 survey – based on data from yield studies, satellite imagery and village-level interviews with farmers and headmen – found indications of both stability and change relative to the 2009 survey. Once again, due to very high yields, Afghanistan produced the world's largest supply of hashish, with a production estimate of between 1,200 and 3,700 tons of cannabis resin a year – an estimate largely unchanged from the year before when the resin yield was estimated to be 1,500 to 3,500 tons a year.

Also relatively stable was the amount of land devoted to growing cannabis, with between 9,000 and 29,000 hectares under cannabis cultivation in 2010. The number of Afghanistan's 34 provinces that grow cannabis, however, increased from 17 in 2009 to 19 in 2010. No significant cannabis cultivation was reported in the remaining 15 provinces.

In Afghanistan, cannabis is planted between April and June and harvested between October and January. While cannabis is mainly cultivated as a mono crop, some farmers cultivate cannabis along with other crops on so-called 'bunds' along the boundaries or edges of fields. Most cannabis fields require irrigation.

The regional distribution of cannabis cultivation continued to change, especially when examined over the last six years. In 2005, cannabis cultivation was concentrated in the northern part of the country; then, between 2005-2009, the centre of cannabis cultivation shifted to the southern part of the country; and in 2010, cannabis cultivation appeared to be more widely distributed. Still, cannabis cultivation has long been associated with opium cultivation and insecurity and in 2010 that connection persisted. Most cannabis is cultivated in the insecure south where most opium is also produced. More than 60% of cannabis farmers also cultivated opium in 2010.

Money and poverty alleviation remain the primary reasons reported by farmers to cultivate cannabis and in 2010 farmers had more incentives to grow cannabis than ever. While prices levels of cannabis in Afghanistan remained relatively stable between 2006-2009, prices rose sharply in 2010, particularly in the Northern and North-eastern regions of the country.

Farmers' gross income from cannabis per hectare in 2010 increased 130%, from US\$ 3,900/ha in 2009 to US\$ 9,000/ha in 2010. This greatly exceeded farmers' gross income from opium (US\$ 4,900/ha) and farmers' gross income from wheat (US\$ 770/ha). Comparatively, gross income from opium increased by 36% in 2010 over 2009, while gross income from wheat fell by nearly half (47%). Consequently, the average gross household income from cannabis-growing households nearly doubled, from US\$1,553 in 2009 to US\$3,000 in 2010. Similarly, the percentage of GDP represented by the total farm-gate value of cannabis resin more than doubled, from up to 0.9% in 2009 to up to 2% in 2010.

Farm-gate prices of cannabis resin powder (garda) varied considerably between the North/North-eastern and other regions. This likely reflects differences in quality (proportion of resin to plant material) as well as other factors such as the degree of resin supply and demand.

Farmers cited the Government ban and the religious ban on cannabis cultivation most frequently when asked why they had stopped cannabis cultivation in 2010. However, considerably fewer farmers in 2010 mentioned the Government ban than in 2009.

1 INTRODUCTION

This report presents the results of the second dedicated Afghanistan Cannabis Survey implemented by UNODC and the Ministry of Counter Narcotics (MCN). The first survey was carried out in 2009, as evidence from cannabis resin seizures had long pointed to Afghanistan as one of the world's main producers of the drug.

The survey consisted of village level interviews with farmers and headmen, yield studies and satellite image interpretation. The main village survey with headmen and farmer interviews was implemented between July and September 2010. Cannabis resin yield was investigated through the information provided by headmen and farmers during the village survey and a yield observation study undertaken in January 2011, when the actual resin production took place. The lower cannabis area estimate is based on the interpretation of 157 very high resolution satellite images, the higher estimate is based on headmen estimates of cannabis cultivation in their village.

As in 2009, the estimation of cannabis cultivation and production in 2010 was in many ways more complicated than for opium poppy. The amount of small-scale cannabis cultivation in kitchen gardens and along the boundaries of fields ("bunds") is difficult to quantify and cannot be captured with the methodology used. The fact that in some provinces cannabis is intercropped with licit crops makes the interpretation of satellite images and responses from farmers difficult. Such mixed fields, which do not show a typical cannabis reflectance pattern in images, cannot be identified with the current methodology. Thus, the area estimate from the remote sensing survey refers only to the mono-crop cannabis fields and does not consider cannabis in kitchen-gardens, along field boundaries and in mixed fields. The volatile situation in southern Afghanistan made the collection of ground truth information to support the satellite image analysis difficult in many areas and impossible in others.

The 2010 cannabis survey has been implemented within the technical framework of UNODC's Illicit Crop Monitoring Programme (ICMP) under the project AD/AFG/F98. The objective of ICMP is to assist the international community in monitoring the extent and evolution of illicit crops within the context of the Political Declaration and Plan of Action on International Cooperation towards an Integrated and Balanced Strategy to Counter the World Drug Problem, adopted by Member States in 2009.⁴

Photo 1: Morphological differences between male and female cannabis plants



Cannabis female plant in Dand district (Kandahar)



Cannabis male plant with flower buds (Kandahar)

⁴ E/2009/28, E/CN.7/2009/12, Political Declaration and Plan of Action on International Cooperation towards an Integrated and Balanced Strategy to Counter the World Drug Problem.

Botanical information on the cannabis plant⁵:

Cannabis - also known as “marijuana” or “marihuana” - is a plant under the Cannabaceae family. It is a dioecious plant, meaning that the male and female flowers develop on separate plants, although monoecious examples with both sexes on one plant are also found. The development of branches containing flowering organs varies greatly between male and female plants. Female flowers are tightly crowded between small leaves while male flowers hang in long, loose, multi-branched, clustered limbs up to 30 centimetres (12 inches) long and shed their pollen and die several weeks prior to seed ripening on the female plant. The female plants tend to be shorter and have more branches than the male ones. Female plants are leafy to the top with many leaves surrounding the flowers, while male plants have fewer leaves near the top with few if any leaves along the extended flowering limbs and can produce hundreds of seeds. Stems are erect, green and hollow and longitudinally grooved. It has been noted that the height of cannabis plants has gone up to 1-3 meters in different parts of Afghanistan. Cannabis normally matures annual and timing is influenced by the age of the plant, changes in the photo-period (length of daylight), and other environmental conditions.

Flowering:

Flowering usually starts when darkness exceeds eleven hours per day. The flowering cycle lasts around four to 12 weeks depending on environmental conditions.

Harvesting:

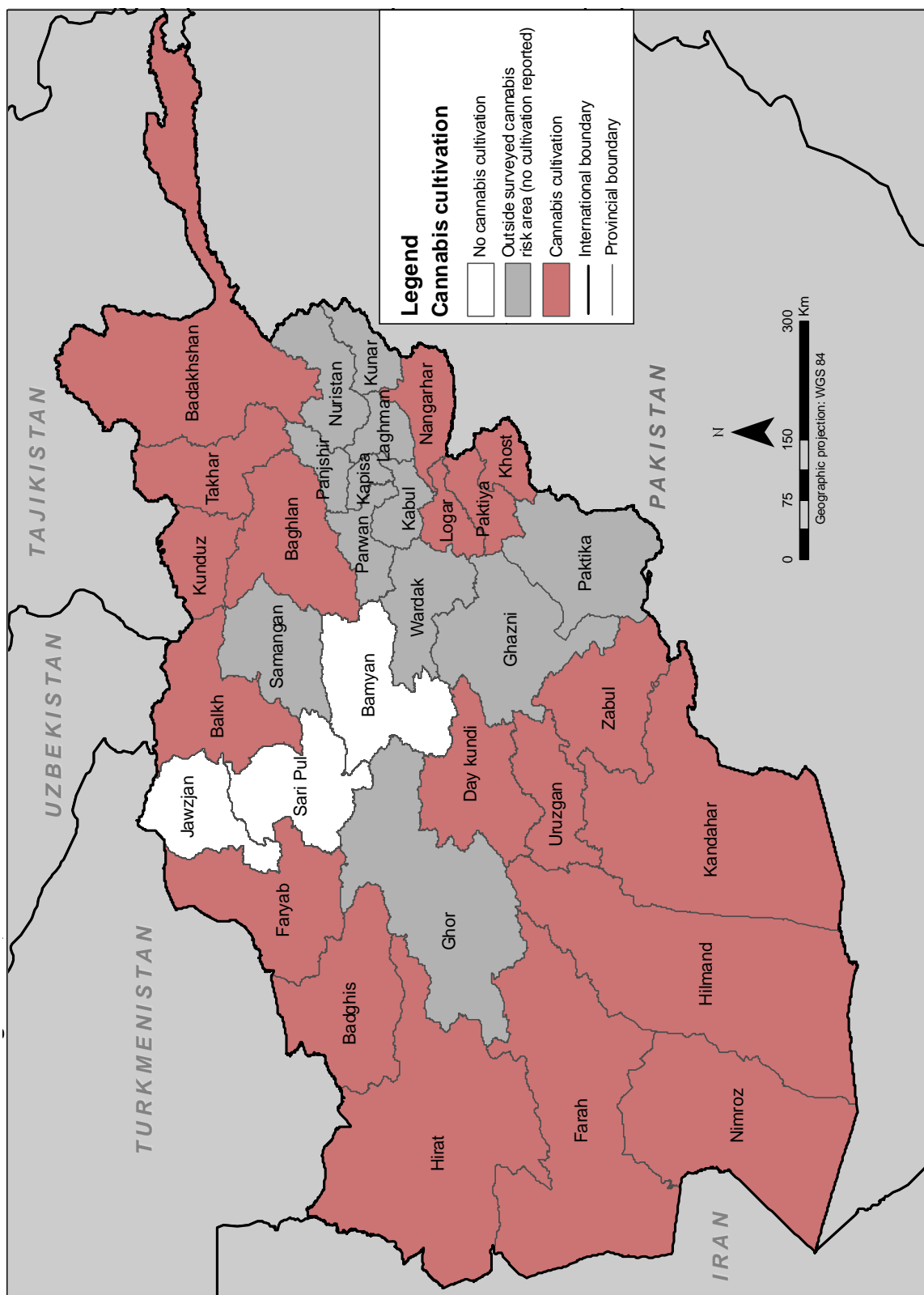
Floral clusters should be harvested when resin secretion and associated terpenoid and cannabinoid biosynthesis are at their peak which is just after the pistils have begun to turn brown but before the calyx stops growing. The floral clusters are responsible for the production of seeds, drugs, and aromatic resins.

Yield:

Yield varies across the different regions of the country. The product obtained from the dried cannabis plant through threshing and sieving is a powdery substance with varying proportions of resin and other plant matter, locally called “garda”. Further processing is required to turn garda into hashish or “charas” as it is called in the local language, the consumable form of cannabis resin.

⁵. Information from David T. Brown (1998): *Cannabis, the Genus Cannabis*. Amsterdam; Robert C. Clarke (1981): *Marijuana Botany*. Oakland; and from UNODC internal reports on cannabis in Afghanistan.

Map 1: Cannabis cultivation status by province, 2010



Source: MCN - UNODC Afghanistan Cannabis Survey 2010
Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

2 FINDINGS

The 2010 cannabis survey covered the “cannabis risk area” in Afghanistan, i.e. 22 provinces, where cannabis cultivation had been observed or reported in past surveys. Field information from the other 12 provinces indicated that cannabis cultivation either did not exist or was limited to kitchen gardens or other forms of small-scale, non-commercial cultivation. The main components of the survey were a socio-economic survey conducted in 1,452 villages in 22 provinces of Afghanistan that included interviews with village headman plus individual interviews with three farmers per village, and the analysis of 157 high-resolution satellite images in 17 provinces. The survey covered only fields with mono-crop cannabis. Small-scale cultivation e.g. in kitchen gardens, flower pots, along the walls of compounds, along the boundaries of fields, “wild cannabis” or cannabis inter-cropped with other crops in the same field at the same time could not be considered for the area and production estimates of this survey. However, the survey investigated these cultivation patterns through farmers’ interviews and found that the vast majority of farmers grow cannabis as a mono-crop.

Cannabis cultivation

Cannabis cultivation in Afghanistan in 2010 ranged from 9,000 ha to 29,000 ha. Due to the uncertainties associated with the area estimates, a mid-point estimate could not be calculated. Cannabis cultivation was found to be much lower than opium poppy cultivation, which in 2010 amounted to 123,000 ha.

The estimation methodology did not allow this survey to produce cannabis area estimates at the provincial level with sufficient accuracy, although over half of cannabis cultivation in 2010 was estimated to be in the Southern region. By and large this regional disparity with a concentration in the south reflects the current pattern of opium cultivation but is less pronounced, as cannabis was also found in several poppy-free provinces.

Cannabis cultivation was found in all 17 provinces covered by satellite images and the village survey and in two more surveyed provinces covered only by the village survey (Khost and Kunduz). The provinces of Khost and Day Kundi, which were outside the cannabis risk area defined for the 2009 survey, were covered by the 2010 survey and cannabis cultivation was observed in both provinces. In Jawzjan province, which had cannabis cultivation in 2009, no evidence of large cannabis fields was found in 2010.

Table 1: Cannabis cultivation by province, 2009 and 2010

PROVINCE	Cannabis cultivation 2009	Cannabis cultivation 2010
Kabul	No cultivation reported*	No cultivation reported*
Khost	No cultivation reported*	Yes
Logar	Yes	Yes
Paktya	Yes	Yes
Panjshir	No cultivation reported*	No cultivation reported*
Parwan	No cultivation reported*	No cultivation reported*
Wardak	No cultivation reported*	No cultivation reported*
Ghazni	No cultivation reported*	No cultivation reported*
Paktika	No cultivation reported*	No cultivation reported*
Central Region	Yes	Yes
Kapisa	No cultivation reported*	No cultivation reported*
Kunar	No cultivation reported*	No cultivation reported*
Laghman	No cultivation reported*	No cultivation reported*
Nangarhar	Yes	Yes
Nuristan	No cultivation reported*	No cultivation reported*
Eastern Region	Yes	Yes
Badakhshan	Yes	Yes
Takhar	Yes	Yes
Kunduz	No	Yes
North-eastern Region	Yes	Yes
Baghlan	Yes	Yes
Balkh	Yes	Yes
Bamyan	No	No
Faryab	Insignificant	Yes
Jawzjan	Yes	No
Samangan	No cultivation reported*	No cultivation reported*
Sari Pul	No	No
Northern Region	Yes	Yes
Hilmand	Yes	Yes
Kandahar	Yes	Yes
Uruzgan	Yes	Yes
Zabul	Yes	Yes
Day Kundi	No cultivation reported*	Yes
Southern Region	Yes	Yes
Badghis	Yes	Yes
Farah	Yes	Yes
Ghor	No cultivation reported*	No cultivation reported*
Hirat	Yes	Yes
Nimroz	Yes	Yes
Western Region	Yes	Yes
Total (rounded)	10,000-24,000	9,000-29,000

* These provinces were outside the cannabis risk area defined by the cannabis survey.

Table 2: Cannabis and opium cultivation by province, 2010

PROVINCE	Opium cultivation 2010 (ha)	Cannabis cultivation 2010
Kabul	152	No cultivation reported*
Khost	Poppy-free	Yes
Logar	Poppy-free	Yes
Paktya	Poppy-free	Yes
Panjshir	Poppy-free	No cultivation reported*
Parwan	Poppy-free	No cultivation reported*
Wardak	Poppy-free	No cultivation reported*
Ghazni	Poppy-free	No cultivation reported*
Paktika	Poppy-free	No cultivation reported*
Central Region	152	Yes
Kapisa	Poppy-free	No cultivation reported*
Kunar	154	No cultivation reported*
Laghman	234	No cultivation reported*
Nangarhar	719	Yes
Nuristan	Poppy-free	No cultivation reported*
Eastern Region	1,107	Yes
Badakhshan	1,100	Yes
Takhar	Poppy-free	Yes
Kunduz	Poppy-free	Yes
North-eastern Region	1,100	Yes
Baghlan	Poppy-free	Yes
Balkh	Poppy-free	Yes
Bamyan	Poppy-free	No
Faryab	Poppy-free	Yes
Jawzjan	Poppy-free	No
Samangan	Poppy-free	No cultivation reported*
Sari Pul	Poppy-free	No
Northern Region	Poppy-free	Yes
Hilmand	65,045	Yes
Kandahar	25,835	Yes
Uruzgan	7,337	Yes
Zabul	483	Yes
Day Kundi	1,547	Yes
Southern Region	100,247	Yes
Badghis	2,958	Yes
Farah	14,552	Yes
Ghor	Poppy-free	No cultivation reported*
Hirat	360	Yes
Nimroz	2,039	Yes
Western Region	19,909	Yes
Total (rounded)	123,000	9,000-29,000

* These provinces were outside the cannabis risk area defined for the 2010 cannabis survey. The 12 provinces outside the cannabis risk area were considered to be without cannabis cultivation as defined for this survey as field information from survey activities in 2009 and 2010 did not indicated the existence of significant cannabis cultivation.

Cannabis and opium cultivation

As in 2009, in 2010 most of the large scale cannabis cultivation occurred in the Southern region where most of the opium cultivation (82%) was found in 2010. All five of the Southern provinces (Hilmand, Kandahar, Uruzgan, Zabul and Day Kundi) were affected by cannabis cultivation. There is a clear geographic association between opium and cannabis cultivation at the provincial level. This association exists at a household level, too, with almost two thirds of cannabis-growing households (61%) also reporting poppy cultivation in the preceding season.

The link between cannabis and opium cultivation appears to exist at the trading level as well. Information gathered during 2010 surveyor debriefings indicated that a large proportion of cannabis traders trade also opium.

Table 3: Cannabis and opium cultivation status 2009 vs. 2010 by number of provinces (34 provinces)

Cultivation status	2009	2010
Cannabis only	7	8
Opium poppy only	4	3
Cannabis and opium poppy	10	11
Neither cannabis nor opium poppy	13	12

Note: Provinces with less than 100 ha of poppy cultivation are considered to be 'poppy-free'. For cannabis, no such threshold was applied as provincial estimates are not available.

Photo 2: Cannabis at flowering stage, Baghlan province, 2010



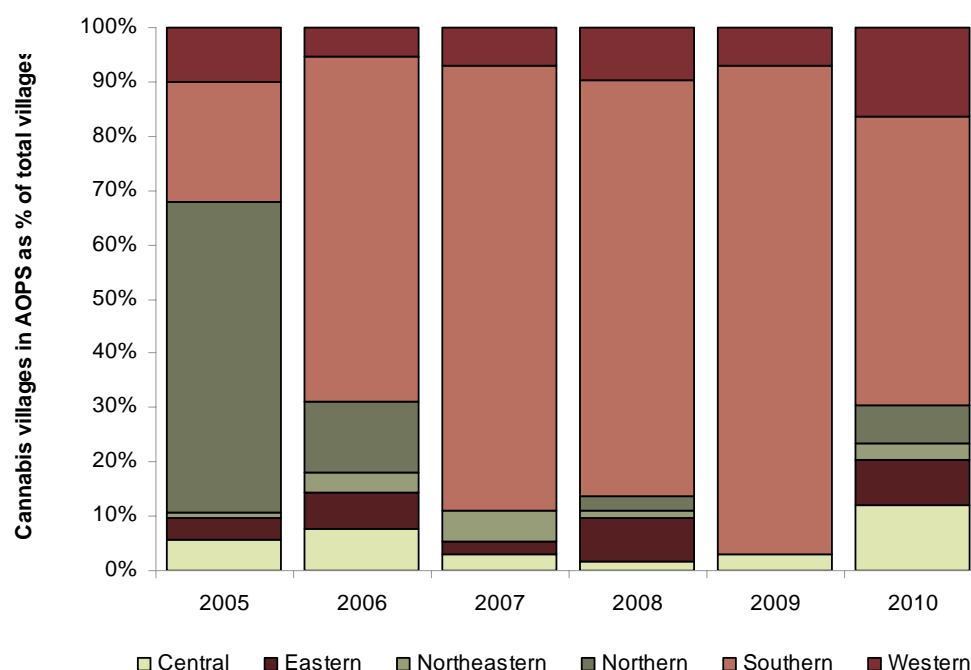
Cultivation trends

A dedicated survey to measure the extend of cultivation and production of cannabis in Afghanistan was undertaken only in the last two years, 2009-2010. However, information on cannabis cultivation was also collected during the Annual Opium Surveys from 2005 to 2010 where, information was collected on farmers' intentions to cultivate cannabis in that year. Some information on trends over that period can be drawn from that source, although there are some limitations. The village level interviews undertaken during the opium survey were conducted during the opium cultivation period (spring) and before cannabis, a summer crop was planted. Thus, the reporting was based on farmers intention rather than actual cultivation as farmers could still change their decision on the summer cultivation. Furthermore, the existence of cannabis cultivation could not be verified by the surveyors during the opium surveys since the crop was not yet visible on the fields. Given these limitations, an accurate area estimate of cannabis cultivation could not be made on the basis of interviews done during the opium poppy survey, but some conclusions can be drawn:

- During the period under review (2005-2010), the proportion of villages reporting cannabis cultivation was always much smaller than the proportion of opium-cultivating villages. Typically, the samples showed about two to four times more opium-cultivating than cannabis-cultivating villages.
- The lower proportion of cannabis-cultivating villages and the smaller area of cannabis cultivated per village compared to opium cultivation, indicate that the level of cannabis cultivation in the years 2005 to 2010 was well below the level of opium cultivation in the same period.
- The proportion of villages in the sample reporting cannabis cultivation in the Southern region dramatically increased between 2005 – 2009, slightly decreased in 2010, while the number of cannabis cultivating villages in the Northern region decreased between 2005 – 2009, and slightly increased in 2010. Due to the low number of cannabis villages found in all years, it is difficult to assess whether these proportional changes indicate a change in cannabis cultivation in absolute terms in these regions.

The information on cannabis collected through the Annual Opium Surveys cannot be compared with the information collected during the two cannabis survey as the opium survey covers all provinces of Afghanistan whereas the cannabis survey covers only provinces identified as the 'cannabis risk area'. In addition, only a small proportion of villages included in the opium surveys reported cannabis cultivation and this limited the reliability of the information collected on cannabis.

Figure 1: Change of cannabis cultivation occurrence by region, 2005 - 2010



Source: Annual Opium Poppy Surveys 2005-2010

Still, data collected from farmers who were not cultivating cannabis in 2010 but had an history of cannabis cultivation (n=889) confirm the North-South shift of cultivation. More farmers from other than the Southern and Western regions were cultivating cannabis in the early years between 2004-2009, while the pattern reversed in the late years.⁶

Figure 2: Years of cannabis cultivation between 2004-2009 reported by farmers who cultivated cannabis at least once during 2004-2009 but not in 2010 (n=889)

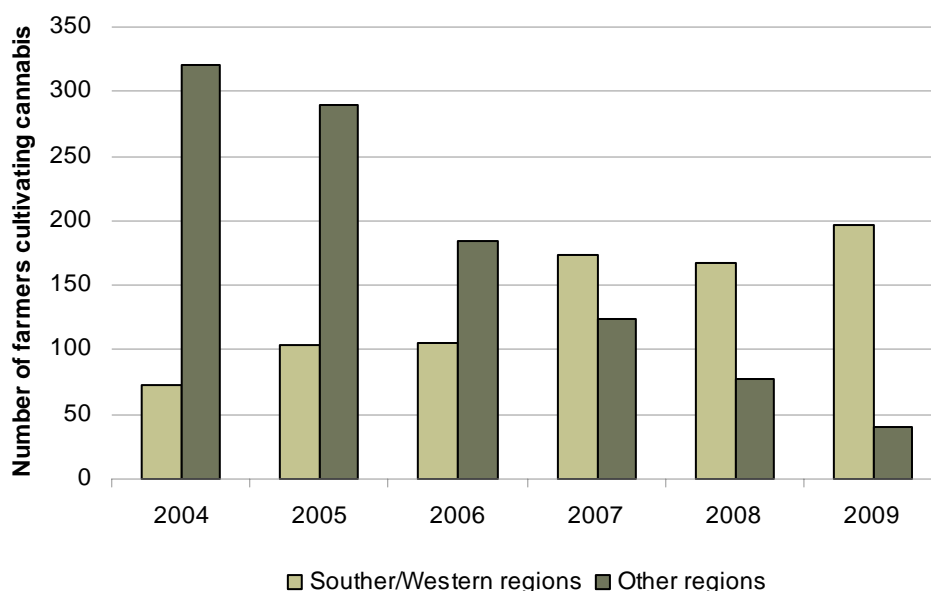


Photo 3: Cannabis field in flowering stage as seen on a false-colour satellite image, central Kandahar province, 2010



⁶ The group of active cannabis farmers in 2010 showed a slightly different pattern: Here, the number of cannabis-cultivating farmers in other regions stagnated in the years 2004 to 2007 and only then increased, whereas in the Southern and Western regions, the number of cultivating farmers increased steadily and strongly in all years. The difference may be due to the fact that the sample size of active cannabis cultivating farmers in 2010 (n=333) is much smaller than the sample of farmers who stopped cannabis cultivation and does not cover all regions well.

Photo 4: Cannabis in flowering stage, Dehsala district, Baghlan province, 2010



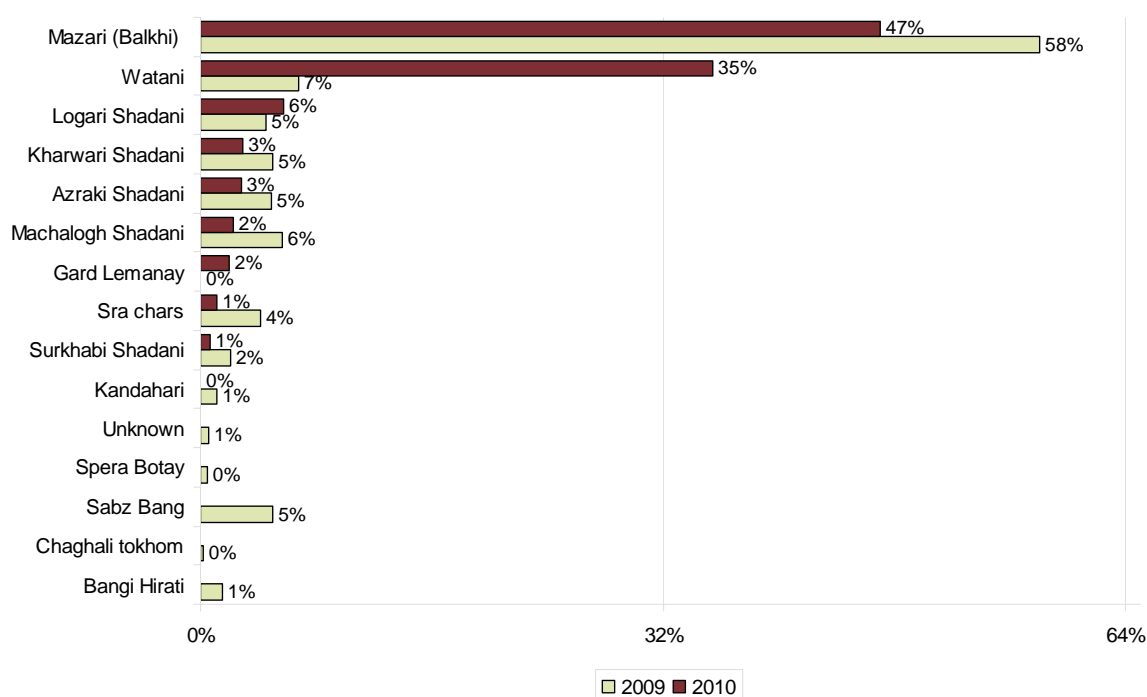
Note: Upper image: false-colour satellite image with cannabis fields delineated in yellow. The green dot indicates the location of the photo below on the satellite image.

Cannabis varieties

So far, there has not been a comprehensive botanical study on cannabis varieties cultivated in Afghanistan. The information on varieties stems from farmers' responses and reflects their naming conventions. It is possible that the same varieties are known by different local names or that the same name is used for different varieties. There are many local names given to cannabis in different regions. Mazari (Balkhi), Watani, Logari Shadani, Kharwari Shadani, Azraki Shadani, Machalghu Shadani, Gerd Lemanay, Sra chars and Surkhabi Shadani are the names of the varieties reported by farmers during the survey in 2010. The most popular cannabis variety in Afghanistan reported in 2010 was the Mazari (Balkhi) variety (47%) followed by Watani variety (35%).

Mazari (Balkhi) variety was the most commonly reported variety in the Southern and North-eastern regions (54% and 59% respectively). In the Eastern region, Watani was the most commonly cultivated cannabis variety (73%). Logari Shadani was the most cultivated variety in the Central and Northern regions, (35% and 40% respectively).

Figure 3: Varieties of cannabis cultivated in 2009 and 2010 as reported by cannabis farmers

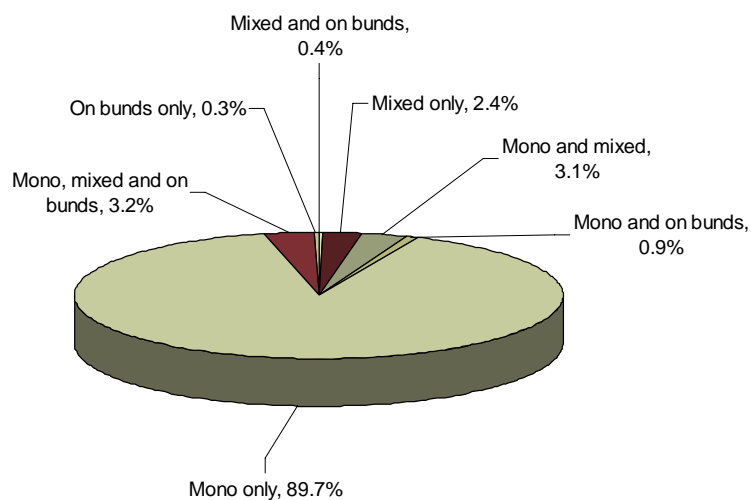


Cannabis cultivation pattern

Cannabis is cultivated as a summer crop after the cultivation of winter crops such as wheat or poppy. It is an annual plant and has to be planted fresh every year. In Afghanistan, cannabis is mainly grown as a mono-crop, but also mixed cropping patterns exist. In addition, cannabis cultivation is found along field boundaries, which are often elevated in the form of small dykes called “bunds”.

Among the farmers who grew cannabis in 2010, 89.7% cultivated it only as a mono-crop, 3.2% grew it as mono/mixed as well as on bunds, 3.1% cultivated cannabis as mono-crop in some fields and mixed in others, and 2.4% cultivated cannabis only mixed with other crops. The results indicate that mono-cropping is the predominant cultivation technique for cannabis, although farmer interviews did not provide a precise estimate of the proportion of mono-crop cannabis within the total area under cannabis cultivation.

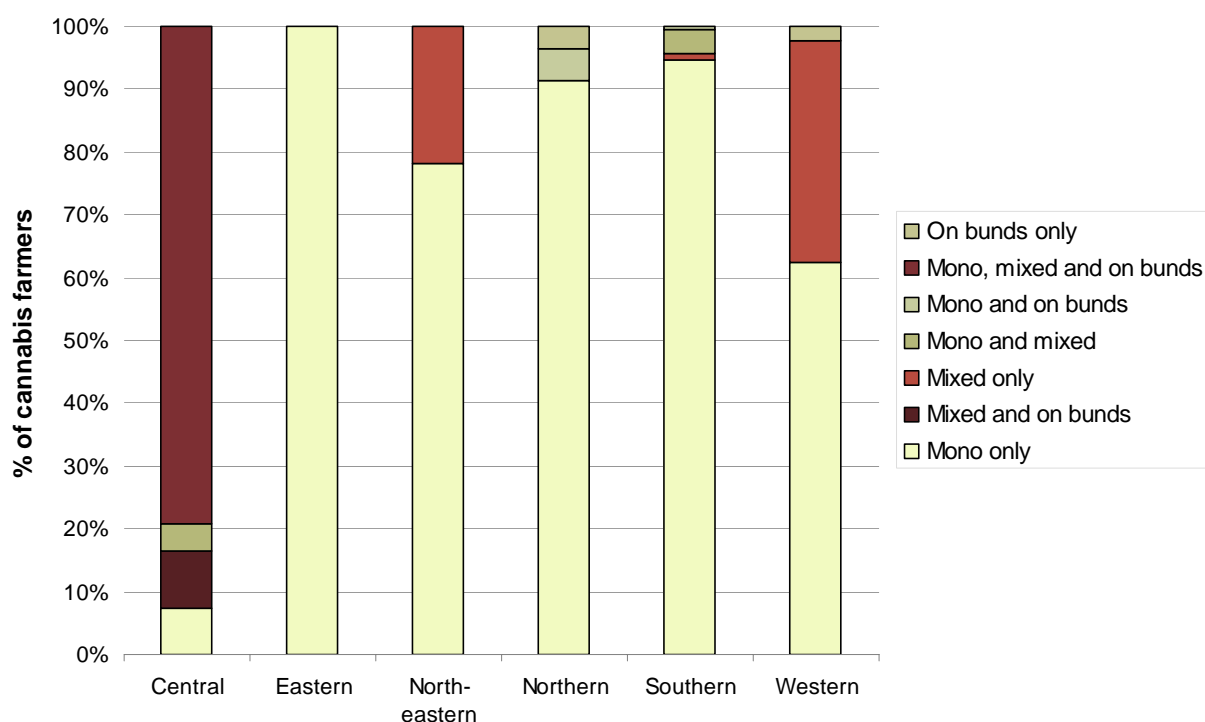
Figure 4: Cannabis cropping patterns reported by cannabis cultivating farmers, 2010 (n=333)



Significant regional differences in cannabis cropping patterns were observed between the Central and other regions. In the Central region, most of the cannabis farmers (79%) reported their cultivation pattern as mono-mixed and on buns while in all other regions most of the farmers reported mono-crop cultivation. Mono-cropping was reported more frequently in 2010 than in 2009, when only 72% of cannabis farmers reported mono-cropping.

Photo 5: Cannabis field (mono-crop) in flowering stage, central Kandahar province, 2010



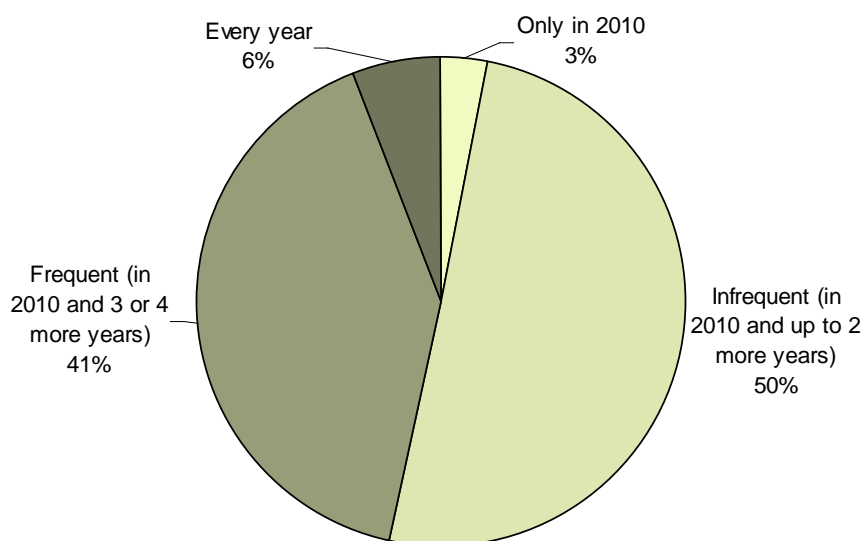
Figure 5: Regional cannabis cropping patterns reported by farmers growing cannabis, 2010 (n=333)

Cannabis is often cultivated mixed with other crops, reportedly in order to protect other crops against insects but also to disguise its illicit cultivation. Licit crops which are often found mixed with cannabis include vegetables, cotton, maize and saffron. Cultivation on bunds is often done for personal use. In the fields surrounded by cannabis, farmers often grow other cash crops such as cotton, okra, and vegetables such as carrot, cucumber, mung bean, etc.

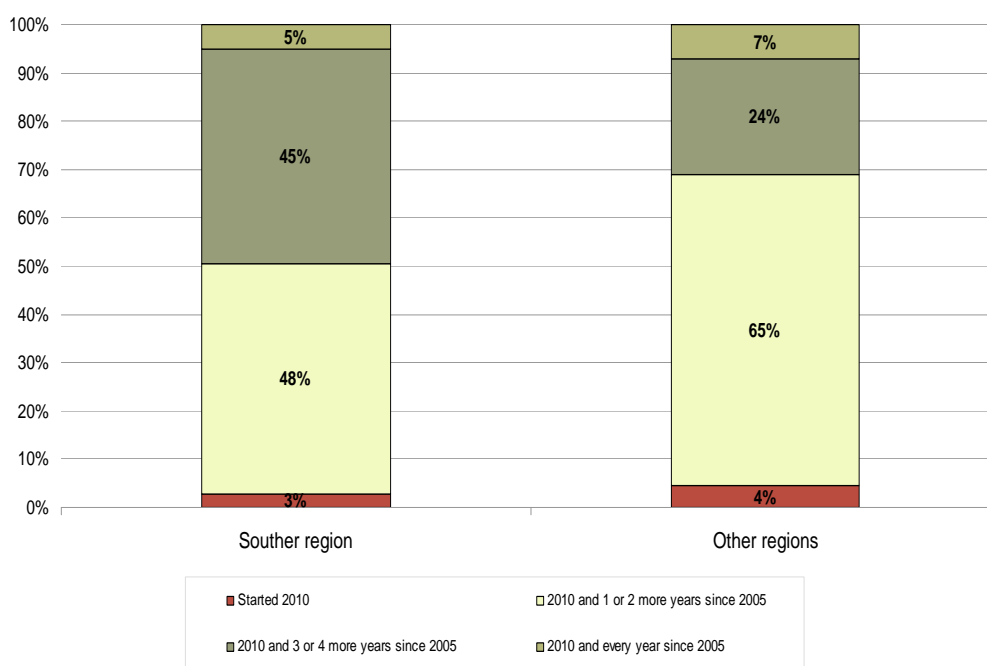
Frequency of cannabis cultivation between 2005-2010

In the village survey, farmers who grew cannabis in 2010 (n=333) were asked if and in which years they cultivated cannabis in the previous five years (since 2005). Only a small proportion of farmers (3%) were new cannabis farmers, i.e. having begun cannabis cultivation in 2010. Just over half of the cannabis farmers had cultivated cannabis on average only every second year or less often in the period 2005 to 2010. Less than half of the farmers cultivating cannabis in 2010 reported cannabis cultivation in most years but only a small proportion (6%) had cultivated in every year of the observation period 2005-2010.

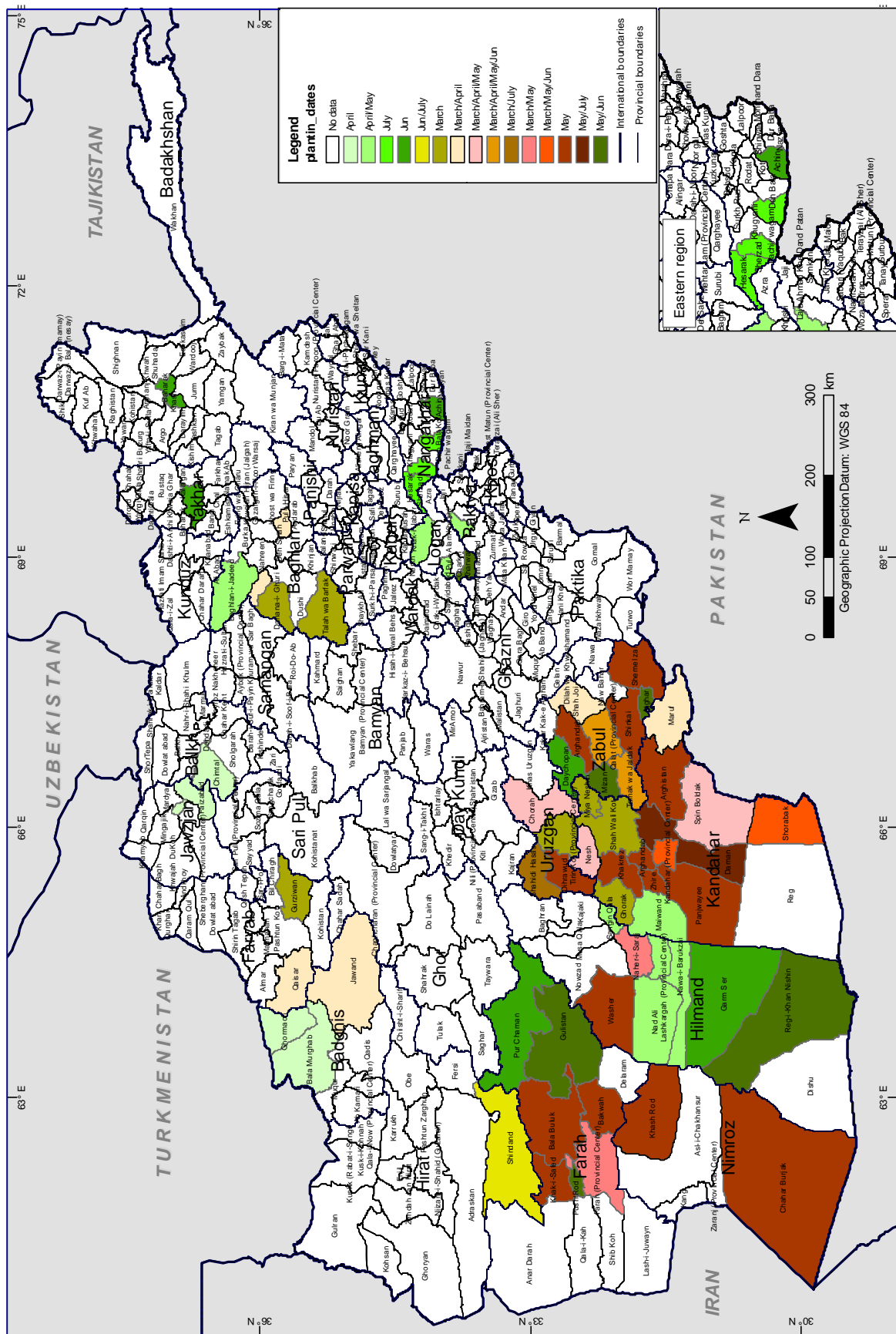
Some differences were found between farmers in the Southern region and other regions where the farmers who currently cultivate cannabis cultivated cannabis in the last 6 years more frequently than in the other regions. In the Southern region, 45% of cannabis farmers grew cannabis in 2010 as well as three or four other years between 2005-2009. In other regions the same percentage was almost half (24%). Nearly half of farmers (48%) in the Southern region had cultivated cannabis in 2010 as well as one or two other years between 2005-2009. This was true also for almost two thirds (65%) of farmers in other regions.

Figure 6: Cannabis cultivation frequency 2005-2010 of farmers cultivating cannabis in 2010 (n=333)

This relatively high rate indicates that in the Southern region cannabis cultivation may be a more permanent feature of households' agricultural portfolio than in other regions. It also suggests that in other regions cannabis might be easier to substitute: households can choose to cultivate cannabis only occasionally and they may have other options when they do not cultivate cannabis. It is possible that the regional shift of cannabis cultivation observed since 2005 is to some extent the result of an intensification in the Southern region (farmers growing cannabis more often, growing cannabis in most years instead of sporadically) and a corresponding cut-back in the Northern region (farmers growing less often, longer intervals between years in which they grow cannabis). Still, the regional disparity observed between the Southern region and the rest of the survey area was less pronounced in 2010 than in 2009. However, changes in cannabis cultivation frequency do not directly indicate corresponding changes in cultivated area, which is determined not only by the number of farmers growing cannabis but also by the average area cultivated by each farmer.

Figure 7: Years of cannabis cultivation between 2005-2010 reported by cannabis growing farmers in 2010 (n=333)

Map 2: Planting dates of cannabis, 2010



Legend

Harvest Calendar

- No Data
- December
- November
- October
- October/November
- September

Provincial boundaries

Internal boundaries

District Boundaries

Eastern region

Scale: 0 50 100 200 300 km

Geographic Projection Datum: WGS 84

Cannabis crop calendar

Typically, the planting season for cannabis in Afghanistan is between March and May. The stem elongation stage of cannabis is between July and August and the crop is in full bloom from September to October. In 2010, in most areas, cannabis plants were fully matured and harvested from the field by the end of December. The resin was extracted between late December 2010 and January 2011.

Results of the village survey show that the cannabis crop cultivation cycle differs slightly across the country due to the variation in climatic conditions:

- Cultivation in the Southern region starts between April and June and harvesting is done in November and December.
- Cultivation in the Central region starts between early April and May and harvesting is in November.
- Cultivation in the Northern region starts between March and April and harvesting is in November and December.
- Cultivation in the North-eastern region starts in April and harvesting is done in November and December.
- Cultivation in the Western region starts between April and May and harvesting is in November and December.
- Cultivation in the Eastern region starts in July and harvesting in December. However, farmers in some parts of Hisarak district of Nangarhar province start cannabis cultivation in March and harvesting in December.

Photo 6: Cannabis field in Paktya province, 2010



Cannabis yield

The production of cannabis resin in Afghanistan involves several steps (see also photos in Annex 1)⁷. First, the cannabis plants need to be dried, then the dried cannabis plants are threshed and sieved to produce a powdery substance locally called “garda”. Through repeated sieving, farmers produce a graded quality which contains different concentrations of cannabis resin. Based on the quantity and quality of cannabis resin, garda is categorized as first garda, second garda and third garda. The first garda is considered to be the best quality since it contains the highest proportion of resin. It is also more expensive than the second and third garda qualities. It is not yet known how exactly farmers and traders determine the garda grade other than counting the number of sieving processes performed to extract the resin. The first, gentle shaking of the plant and sieving of plant material usually produces first garda quality, although this first garda powder may later be mixed with garda from subsequent sieving rounds and still be called and traded as “first” garda.

Most cannabis farmers sell garda (resin) to traders in its powdery form, although some process it further into hashish, which is locally called “charas”. This transformation of garda into hashish is usually done by traders. Hashish is the final product used for trafficking and consumption. The information collected during the survey suggests that the amount of hashish produced from 1 kg of cannabis garda varies across regions probably due to the different hashish production methods. With the current knowledge of different hashish production methods used in Afghanistan, it is reasonable to assume a 1:1 conversion rate of cannabis garda into hashish.

Photo 7: Mature female cannabis plant with resin glands



Mature female Cannabis plant with buds cultivated in North Afghanistan

Research indicates that regional differences exist in processing cannabis into garda. For the purpose of estimating yield and production, provinces were grouped into two regions, North/North-east (N/NE) and South, East, West and Central (S-E-W-C). In the North and North-eastern region, processing methods resulted in a higher quality but less quantity of first garda, whereas in the South, East, West and Central a larger production of first garda was obtained but with a lower quality (less resin and more plant material). The garda from the North and North-eastern region (Mazari or Balkhi garda) contains more resin without the mixture of cannabis leaves, in contrast to other regions where, during the processing of first garda, farmers mix the resin with cannabis leaves.

Table 4: Average cannabis garda yield by region (kg/ha), 2010

Region	1 st garda (kg/ha)	2 nd garda (kg/ha)	3 rd garda (kg/ha)	Total yield (kg/ha)
N/NE (n=14)	35	36	29	99
S-E-W-C (n=25)	67	42	24	133
Weighted average*	63	41	24	128

* Weighted by production, n refers to number of surveyed fields.

⁷ More information on cannabis resin yield and hashish production can be found in UNODC/MCN: Afghanistan Cannabis Survey 2009, April 2010.

Potential cannabis production

Total cannabis garda production, including all garda qualities, was estimated in 2010 to be between 1,200 mt and 3,700 mt. This estimation range reflects the range reported for the cannabis cultivation area. Most of the produced garda was of first quality. There are no standards across regions for garda qualities and garda of one quality type may not be homogenous. The survey did not investigate THC content or other chemical properties of garda produced in Afghanistan, hence its potency level is unknown.

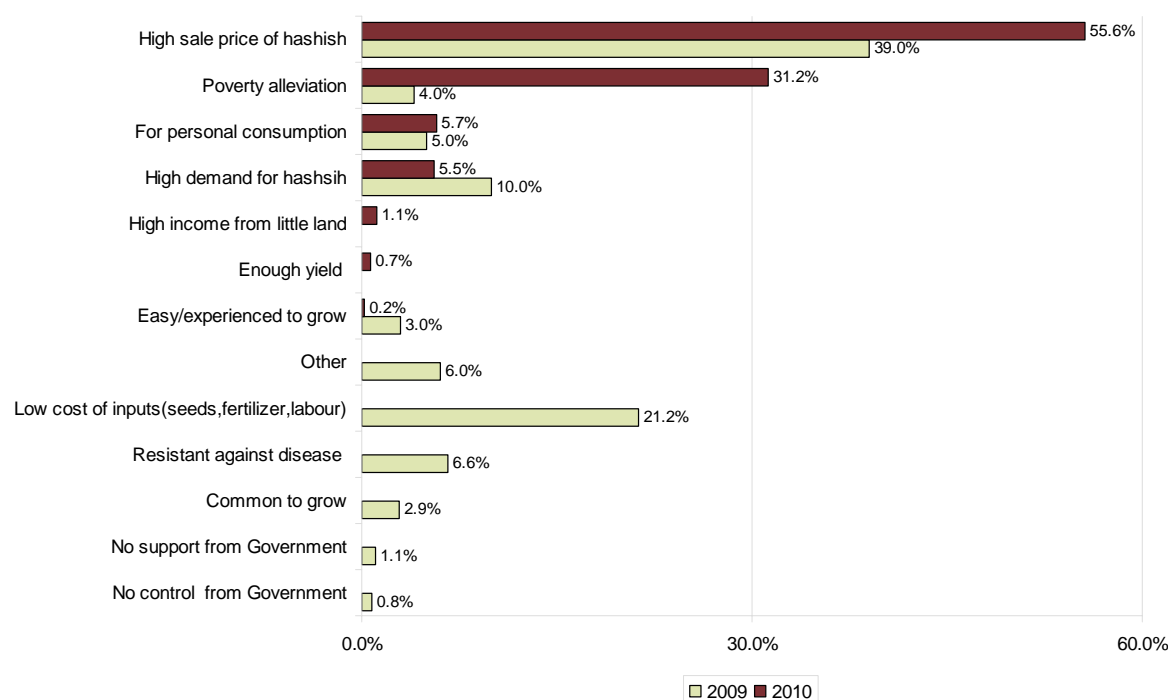
Table 5: Potential cannabis resin garda production, 2010

	1st garda (mt)	2nd garda (mt)	3rd garda (mt)	Rounded total (mt)
Lower bound	588	385	228	1,200
Upper bound	1,832	1,199	709	3,700
As % of total garda	49%	32%	19%	100%

Reasons for cultivating cannabis

Cannabis-cultivating farmers were asked for their most important reasons for doing so. The two most frequently reported reasons in 2010 were, the high sales price of hashish compared to licit crops (55.6%) and poverty alleviation (31.2%). Other reasons why farmers cultivated cannabis included personal consumption (5.7%) and high market demand (5.5%). In 2010, there was a strong increase in the proportion of farmers mentioning “High sale price of hashish” as their main reason compared to 2009, reflecting the sharp increase of cannabis price of cannabis in 2010.

Figure 8: Reasons for cultivating cannabis in 2009 and 2010 (n = 333)

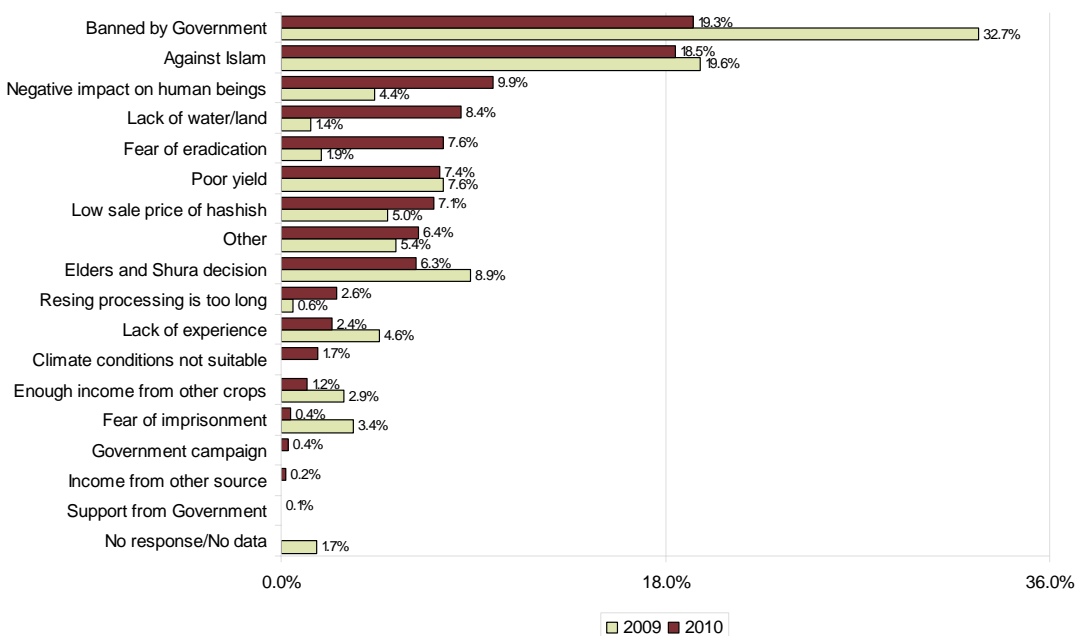


Reason for stopping cannabis cultivation

Like opium poppy, cannabis is an illicit crop in Afghanistan and the possession of cannabis products is a legal offence. A high number of farmers reported that they stopped cannabis cultivation because of the government ban (19.3%). The other dominant reasons were that cultivation is against Islam (18.5%), followed by its negative impacts on human beings (9.9%) and a lack of water and/or land (8.4%). Other reasons included fear of eradication, poor yield, low sale price of hashish, decisions of elders and Shura, resin processing taking too long, a lack of experience, unsuitable climate conditions, and having sufficient income from other crops.

A much lower proportion of farmers mentioned the government ban on cannabis cultivation in 2010 than in 2009 as their main reason for having stopped cultivation. On the other hand, a larger proportion reportedly the fear of eradication, although there are no reports of cannabis eradication in recent years.

Figure 9: Reasons for stopping cannabis cultivation (n = 889)



Conditions for potentially resuming cannabis cultivation in future

The farmers who stopped cannabis cultivation were asked under what conditions they would restart cultivation. Most farmers responded that they would grow cannabis again if the sale price of hashish was high (67.2%).

Reason for never cultivating cannabis

Farmers who never grew cannabis were asked for the most important reasons why they never cultivated cannabis. The most frequently mentioned reason for never growing cannabis was that it is forbidden by Islam (54.6%). The second reason was the government ban on cannabis cultivation (10.7%), followed by farmers not being accustomed to growing cannabis (8.8%). In addition, farmers said they never grew cannabis because of its negative impact on human beings (6.5%), their lack of experience (6.3%), and unsuitable climate conditions (3.3%). Other reasons included the lack of water and/or land to cultivate cannabis on, the poor yield, the decision made by the elders Shura and having enough income from other crops.

Figure 10: Conditions for potentially resuming cannabis cultivation in future, reported by farmers who stopped cultivation (n=889)

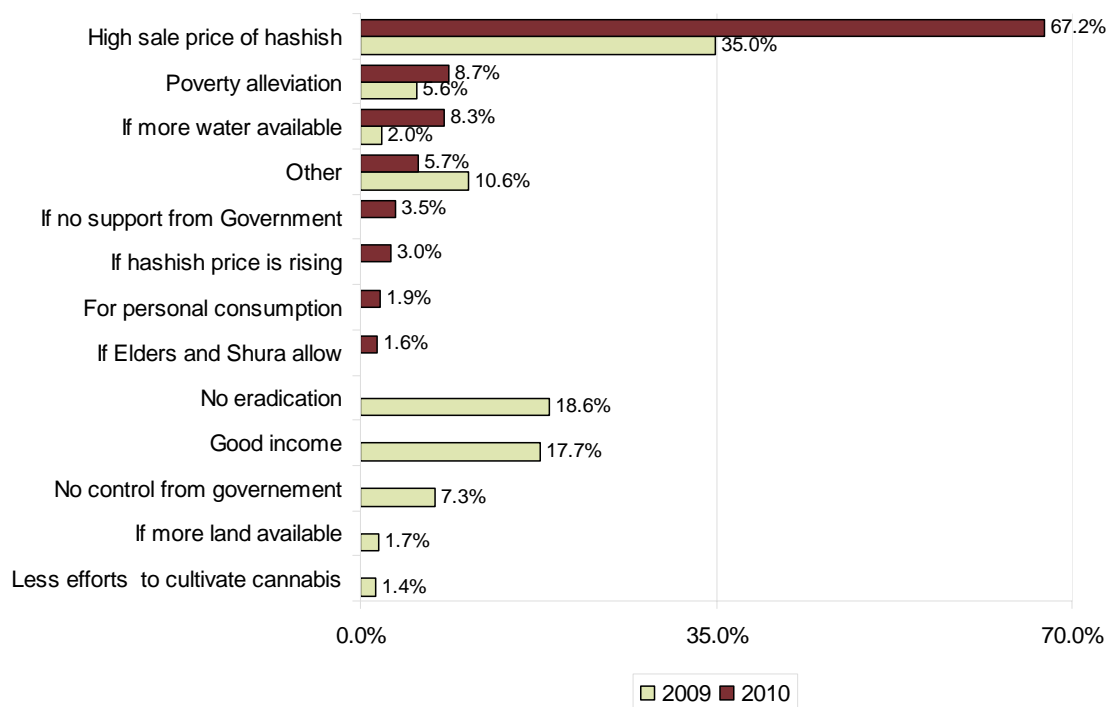
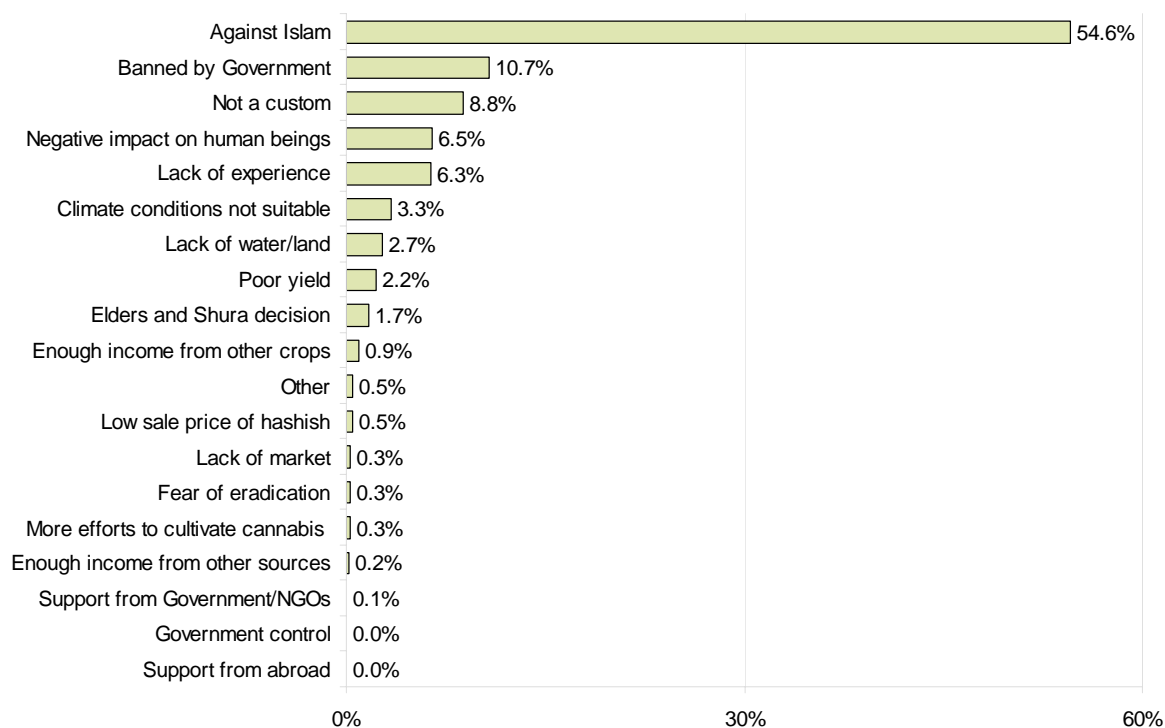


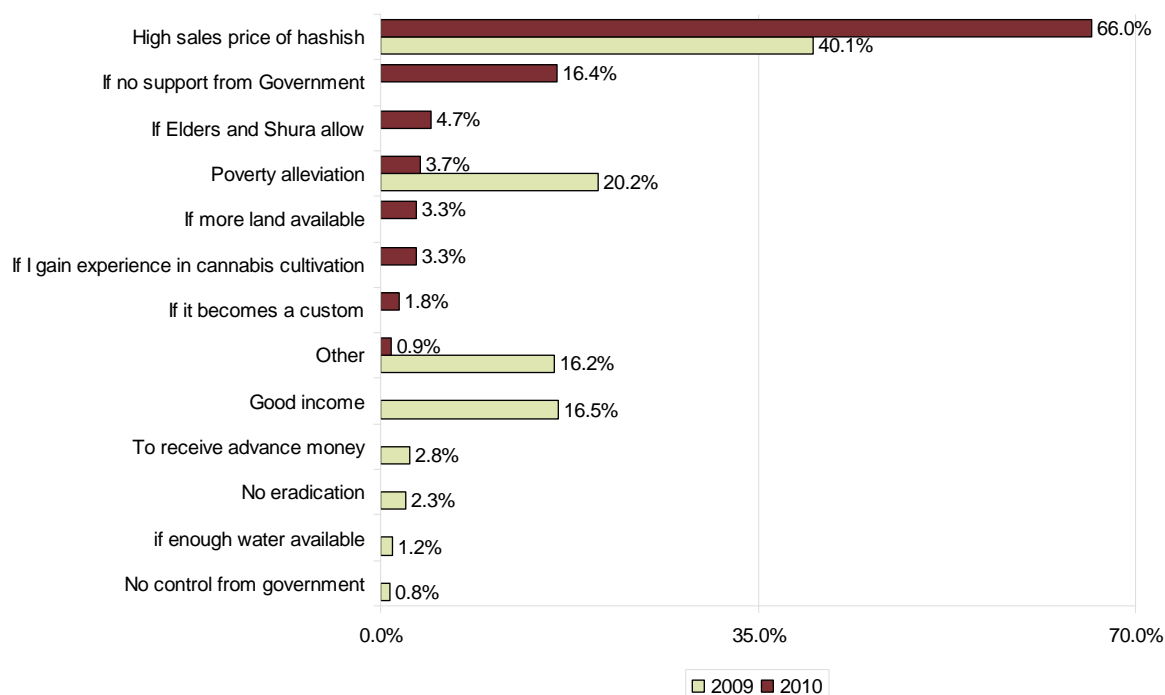
Figure 11: Reasons for never cultivating cannabis 2010 (n = 3,134)



Conditions which would lead farmers who had never grown cannabis to start cultivating it

Farmers who had never grown cannabis were asked under what conditions they would start cultivating cannabis. The conditions included a high sale price of hashish (66.0%), lack of support from the government (16.4%), if elders and Shura allowed it (4.7%), and poverty alleviation (3.7%). Few farmers reported that they would start if they own more land, if they gain experience in cannabis cultivation (both 3.3%) and if it became a custom (1.8%).

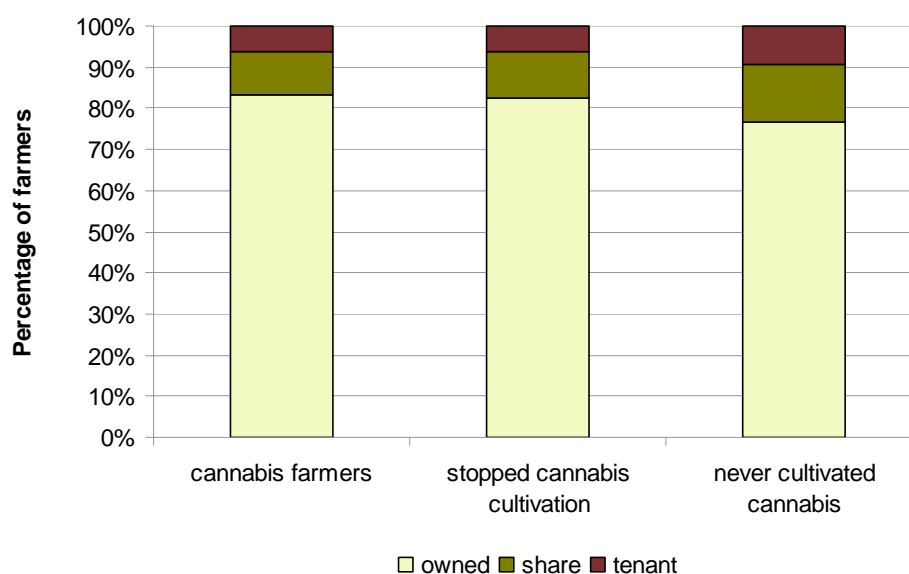
Figure 12: Reasons for potentially cultivating cannabis in future as reported by farmers who never grown cannabis in 2009 and 2010 (n=3,134)



Land tenure

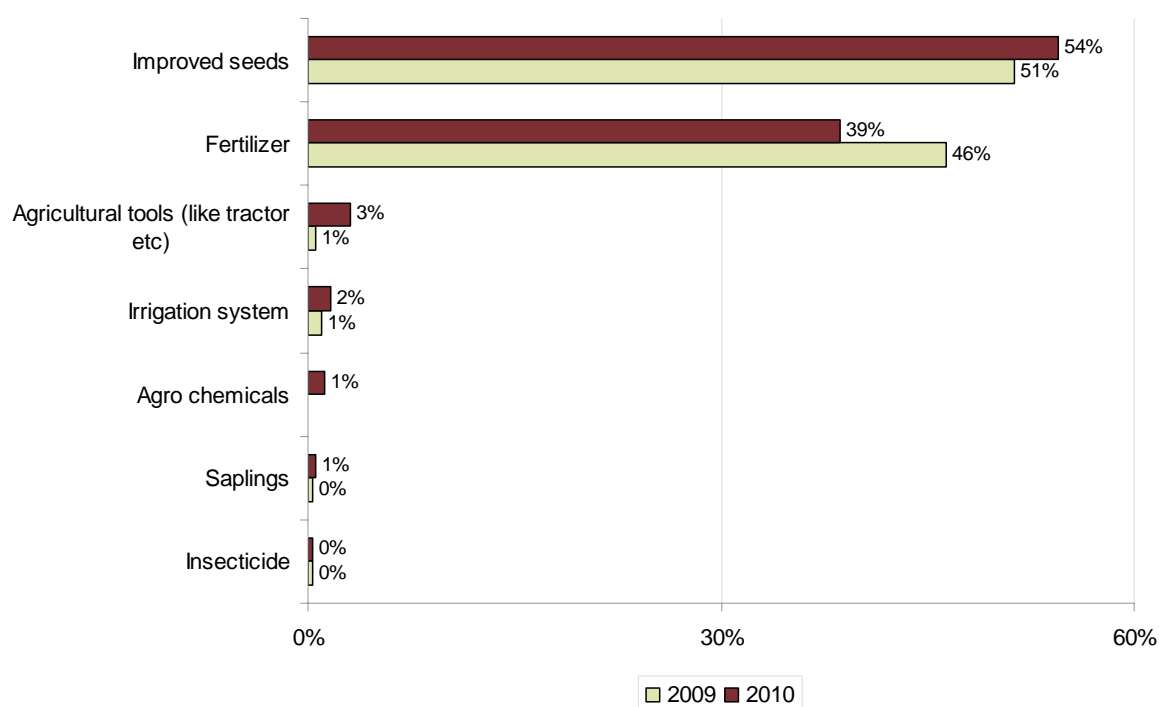
Most of the surveyed cannabis farmers own (part of) the land they cultivated.⁸ However, in all regions there were also a number of farmers who were sharecroppers and/or tenants and did not own any land. Cannabis farmers on average own 83% of the total land they cultivate. Farmers who cultivated cannabis at least once between 2004 and 2009 but not in 2010, on average, own 77% of the land they cultivate. Farmers who never cultivated cannabis own 82% of their cultivated land. These results indicate that there is no significant difference in land tenure between cannabis-cultivating farmers and farmers who did not cultivate cannabis in 2010.

⁸ Farmers were asked about the tenure status of the land they cultivated in general and not which type of land they used to cultivate cannabis. The question whether cannabis is rather grown on land owned or under sharecropping or other tenancy arrangements needs to be clarified in future surveys.

Figure 13: Ratio of farmer status to land

Agricultural assistance received

Village headmen were interviewed in each of the 1,452 surveyed villages in an effort to understand farmers' access to agricultural assistance services. Less than half of villages surveyed (41%) reported having received agriculture assistance. The types of assistance varied and included improved seeds (54%), fertilizers (39%), agricultural tools such as tractors (3%), and irrigation system improvements (for example Karez and stream cleaning, dam construction or well digging) (2%). Support in the form of agro chemicals, saplings and insecticides were minimal.

Figure 14: Types of agricultural assistance received in 2010 as reported by headmen (n=591)

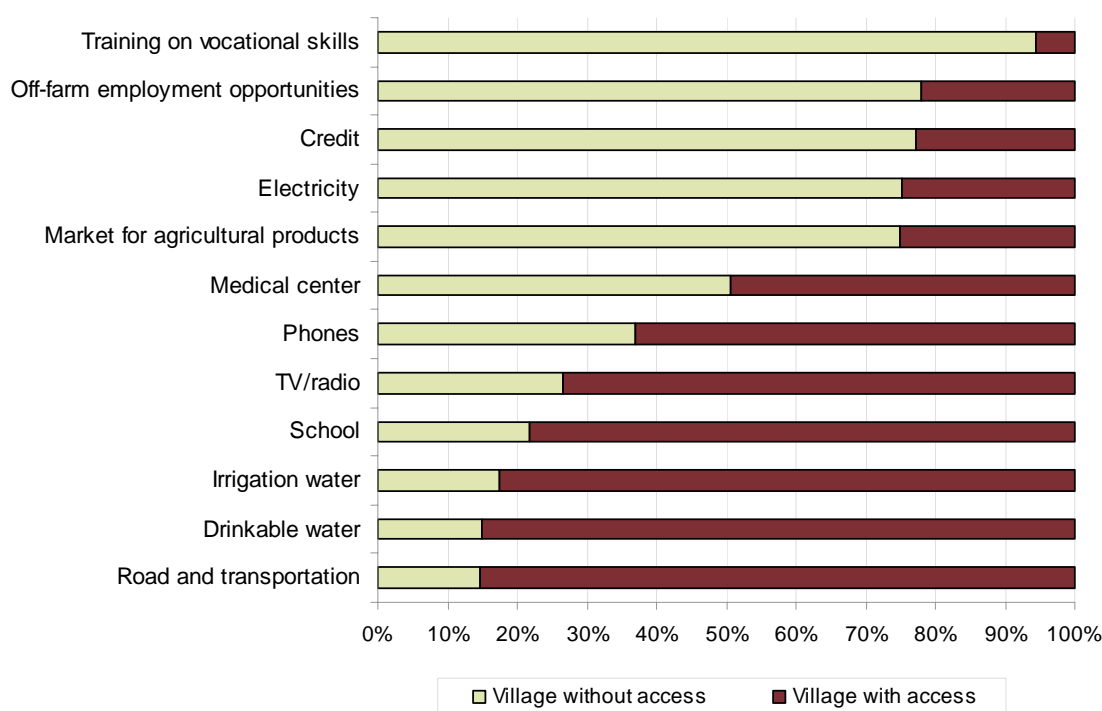
The association between cannabis cultivation and the lack of agricultural assistance was statistically significant and suggested that at the village level the provision of agricultural assistance may have

influenced the decision of cultivating cannabis in 2010. Villages that received some kind of agricultural assistance were less likely to grow cannabis than villages that did not. However, other factors may also have played a role, for instance the security situation which influences the delivery of agricultural assistance, especially in the Southern region where most cannabis cultivation occurs.

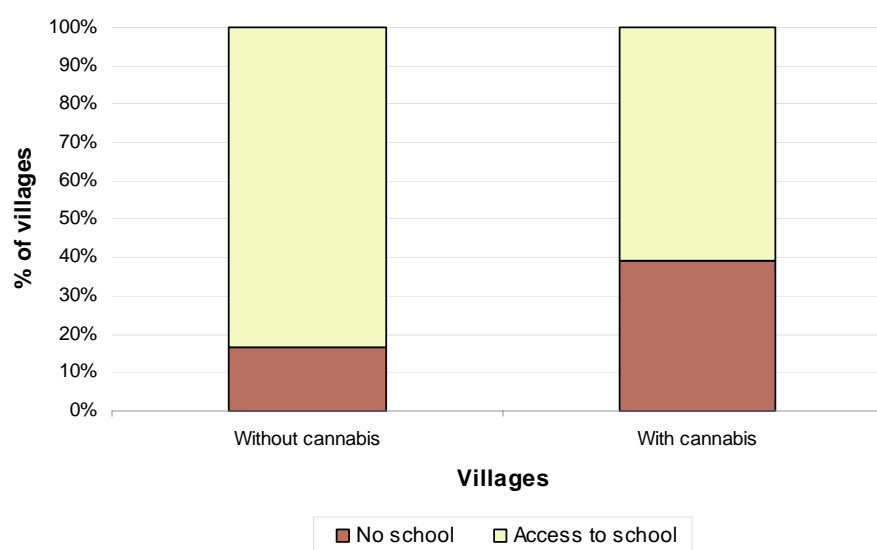
Access to facilities

All village headmen were interviewed on the status and availability of basic development facilities in their villages. Information was collected on access to credit, electricity, irrigation, markets for agricultural products, medical facilities, off-farm employment opportunities, telephones, drinking water, road and transportation, school, vocational skills training and access to TV/radio.

Figure 15: Access to services in the cannabis risk area, 2010 (n = 1,452)



According to the information provided by headmen, over three quarters of the villages had no access to credit, electricity, markets for agricultural products, off-farm employment opportunities or vocational skills training. Over three quarters of the villages had access to drinkable water, irrigation water, road and transportation, school and TV/radio. Almost two thirds of the villages had access to telephones, while half of the villages had access to a medical centre.

Figure 16: Access to schools in the cannabis risk area, by cannabis growing status, 2010

With regard to access to roads/transportation and markets for agricultural products between cannabis-growing and non-cannabis growing villages, more cannabis-growing villages reported having access to markets for agricultural products and roads/transportation than non-cannabis growing villages. This may be due to the fact that most cannabis-growing villages were located in the Southern region where the terrain is mainly flat and transport in general is easier than in mountainous regions. Further differences were found in access to schools. The proportion of villages without access to schools was higher among cannabis-growing villages than non-cannabis-growing villages.

It was not possible to verify the information provided by headmen. However, it can be concluded that basic conditions for agricultural development were absent in large parts of the cannabis risk area. Lack of access to educational facilities is a concern especially in cannabis-growing villages.

Income sources of farmers and cannabis cultivation

Data on the source of income for the year 2009 were collected in 2010 for all three types of farmers: cannabis-cultivating farmers, farmers who stopped cultivating cannabis in 2010 or before, and farmers who had never grown cannabis. The average reported income of cannabis-cultivating farmers was higher than the income of farmers who stopped cultivation and farmers who have never cultivated cannabis. Moreover, the main income sources for farmers who cultivated cannabis were cannabis (35%), poppy (26%) and wheat (16%). The main income sources in 2009 for farmers who stopped cannabis cultivation in 2010 were wheat (23%), opium poppy (20%), cannabis (14%) and other crops (16%). Wheat (33%), other crops (25%), livestock (15%) and remittances (14%) were the main income sources of farmers who had never grown cannabis. Wheat was the major income source for both farmers who stopped cannabis cultivation and those who never cultivated cannabis. Remittances represented a much higher proportion of income in households that never cultivated cannabis (14%) compared to households that grew cannabis (3%). It seems that households which do not have income from cannabis as a cash crop need to rely more on remittances from abroad as they may not earn an equivalent cash income from other cash crops or local income strategies. A similar pattern was observed in the opium surveys where households not growing poppy had a higher proportion of income from remittances.

Figure 17: Contributions to 2009 income in cannabis-growing households by source (data collected in 2010)

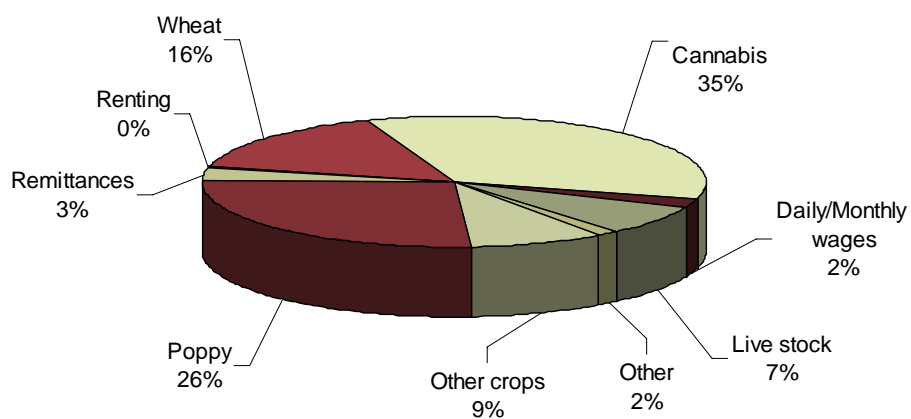


Figure 18: Contributions to 2009 income in non-cannabis growing (stopped cannabis cultivation in 2010 or before) households by source (data collected in 2010)

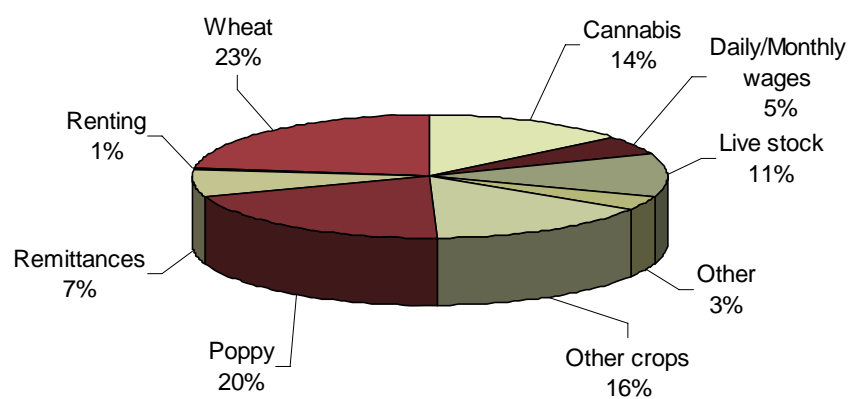
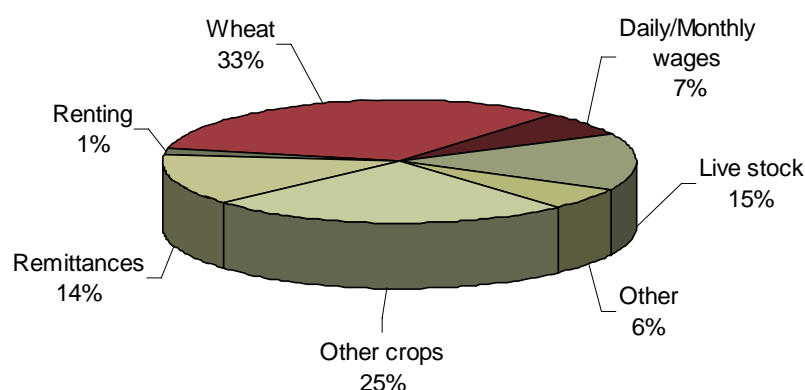


Figure 19: Contributions to 2009 income in non-cannabis growing (farmers who never cultivated cannabis) households by source (data collected in 2010)

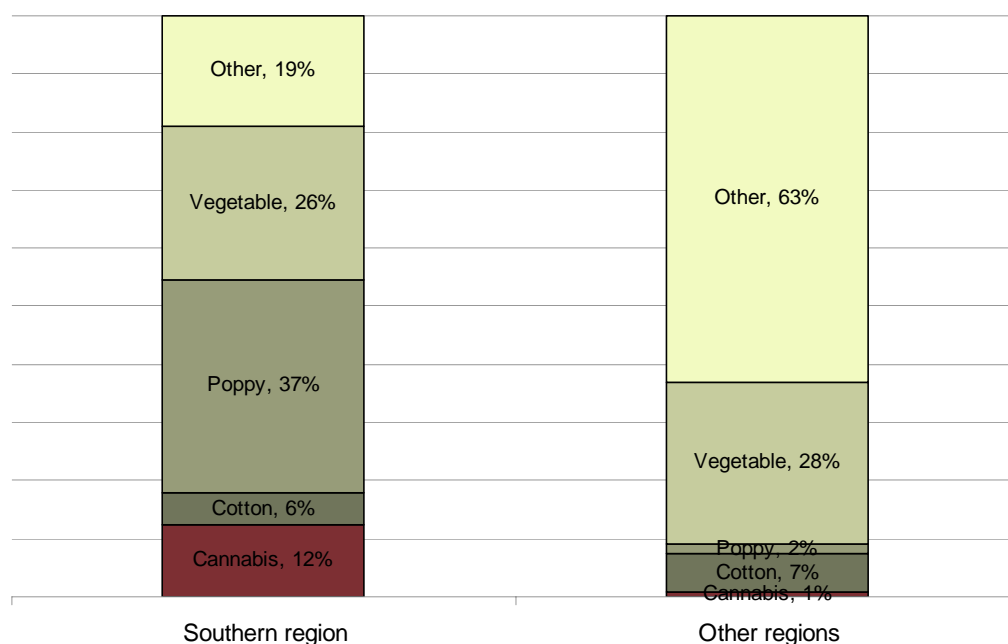


Cannabis and other cash crops

Farmers who cultivated cannabis also cultivated several other cash crops such as cotton, poppy and vegetables. This indicates that cannabis is not the only cash crop cannabis-farmers plant, but typically one of several cash crops that make up a diversified cash crop strategy.

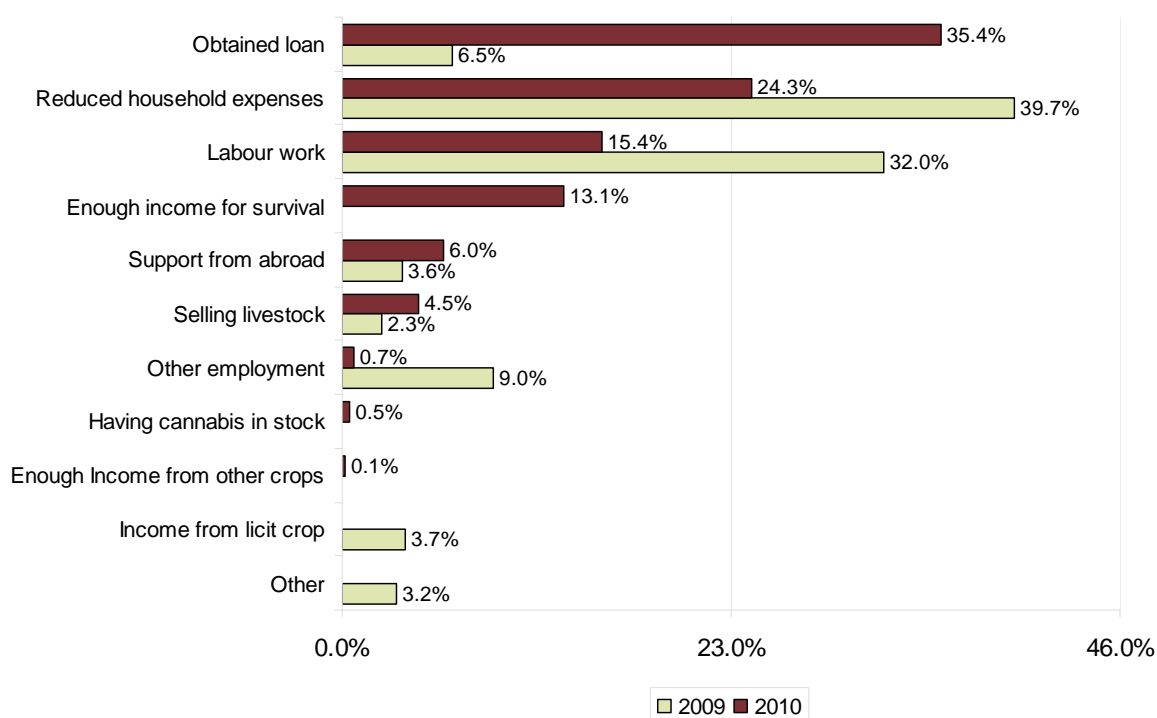
There is a clear difference between the Southern region and other regions in how farmers divide the area dedicated to cash crops. In the Southern region, overall, 12% of the area cultivated with cash crops was cultivated with cannabis and opium poppy (37%). Other major cash crops were vegetables (26%) and 'other crops' (19%). This confirms the close link between cannabis and poppy cultivation in that region, as well as the fact that poppy is still the dominant illicit crop.

In other regions, 'other crops' take up 62% of the cultivated area, followed by vegetables (28%) and cotton (7%). Cannabis is only cultivated on 1% of the area utilized for cash crops. This indicates that cannabis-growing farmers in these regions have other cash crop options in addition to cannabis. There is currently no detailed information available on what kind of crops the 'other' category includes. Since this category is a large percentage of the available cultivated area, more detailed research is required.

Figure 20: Distribution of cultivated area under main cash crops for cannabis farmers, 2010 (n=333)

Coping strategy for the reduced income of farmers who stopped cultivating cannabis

Farmers who stopped cannabis cultivation were asked if their income had decreased, increased or had not changed. About 30% reported that their income had decreased and that they had difficulties coping with the situation. Many had to obtain a loan (35.4%) and/or had to reduce household expenses (24.3%). Some farmers reported that they had to engage in wage labor (15.4%). The proportion of farmers who had to obtain a loan after stopping cannabis cultivation (35.4%) is higher than in 2009 (6.5%) and it raises a concern as these farmers may more easily resume cannabis cultivation to repay their debt if other income strategies are not viable or economically attractive.

Figure 21: Coping strategies for the reduced income after having stopped cannabis cultivation

Cannabis cultivating households

Based on headmen interviews, the number of cannabis-growing households in 2010 was estimated at 47,000 households. The number is consistent with the range that can be calculated on the basis of the area under cannabis cultivation (9,000 ha to 29,000 ha) and the estimated average area under cannabis cultivation per household (0.33 ha). Based on this calculation, the number of households involved in cannabis cultivation ranges between 27,000 and 88,000. Despite the uncertainty expressed in the range, this confirms that in 2010 the number of cannabis-growing households was much lower than the number of poppy-growing households (248,700).

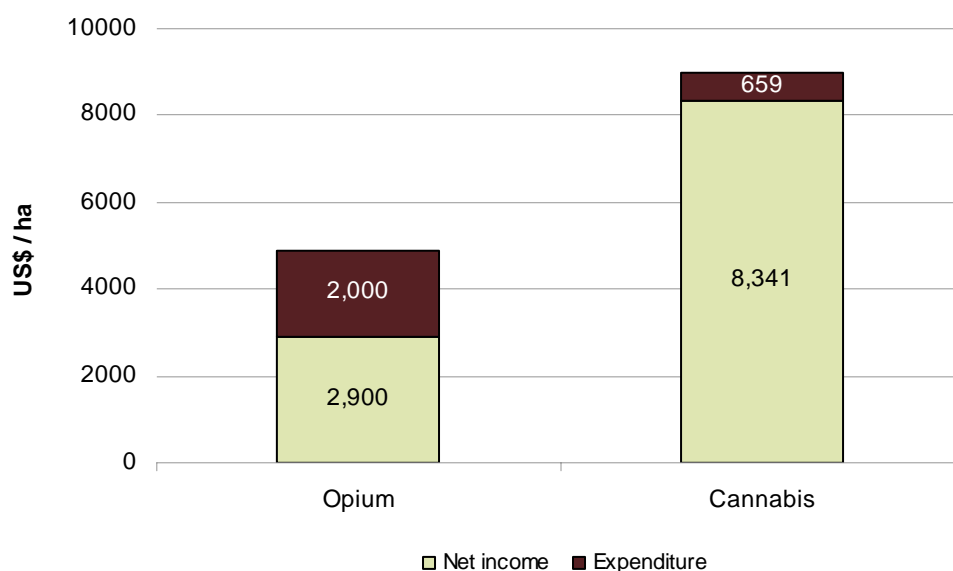
The estimated number of cannabis-growing households in 2010 increased by 18% from 2009 (40,000 households). However, as the average cannabis area cultivated per household was smaller in 2010 than in 2009 (0.33 ha compared to 0.4 ha), the increase in households does not necessarily mean an increase in total cannabis area.

If the number of households involved in cannabis cultivation would be estimated on the basis of headmen interviewed in 2010 during the opium village survey, the number would be 53,000 households. This estimate is within the uncertainty range discussed above, but the number calculated on the basis of the cannabis village survey (48,000) provides a more accurate account. The cannabis village survey targets more specifically the cannabis risk area and collects information at the time when cannabis is cultivated. The opium survey is implemented in most regions before the cannabis season and reflects the number of households the are expected to grow cannabis.

Income from cannabis

Based on average prices at harvest time and the average 2010 resin yield, farmers achieved a gross cash income per hectare of US\$ 9,022/ha (rounded US\$ 9,000/ha) from cannabis resin. This is significantly higher than the gross income from opium in 2010 (US\$ 4,900/ha). The gross income from cannabis resin does not take into account the potential value of cannabis by-products such as cannabis seeds or stalks.

Figure 22: Average annual per hectare income from cannabis and opium (US\$/ha), 2010



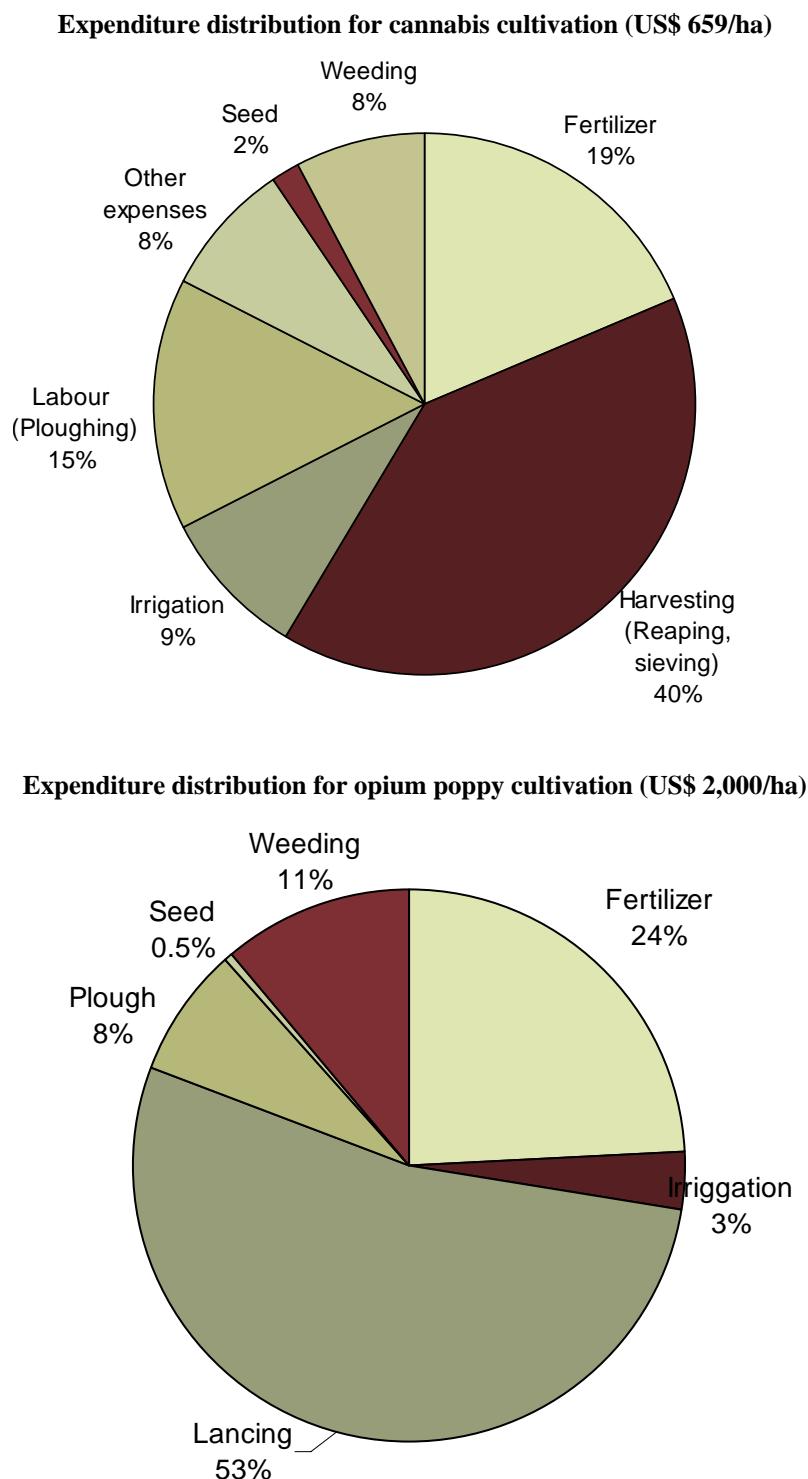
With an average of 0.33 ha per household, the average gross income from cannabis per household amounted to about US\$ 3,000. This is higher than the gross income per household from opium in 2010 (US\$ 2,400).

The expenditure per hectare of cannabis cultivation was estimated at US\$ 659/ha or 7% of gross income. The relatively low proportion of expenditures compared with the gross income is due to the massive increase of cannabis farm-gate prices between 2009-2010 and the relative little increase in the prices of agricultural inputs. The costs associated to cannabis cultivation is much lower than the costs for opium cultivation, which was estimated at US\$ 2,000/ha or 41% of gross income from opium per hectare. For opium cultivation, lancing costs constituted more than half of all expenditures, in contrast to cannabis

where cultivation, harvesting and cannabis extraction (sieving) accounted for less than half of the total expenditure per hectare. Fertilizer and ploughing labour costs were also important expenditures.

In combination with a relatively high gross income per hectare, these relatively low expenses make cannabis a much more profitable crop than opium poppy. However, the survey showed that a much smaller number of households was involved in cannabis cultivation and that the average area cultivated with cannabis per household was smaller than the average area households cultivate for opium poppy. In addition, mixed cropping with cannabis cultivation is common in some regions, but very rare in opium cultivation.

Figure 23: Comparison of expenditure distribution per hectare of opium and cannabis cultivation, 2010



One hypothesis of why households do not grow more cannabis is that there is less land available for cultivation in the summer, when cannabis is grown, due to less water being available for irrigation. Availability of irrigation water is crucial under the climatic conditions of Afghanistan. This is especially true in the Southern region where less water is available during the summer (when cannabis is grown) than in the beginning of the year after the snowmelt during the main poppy and wheat season. In subsistence agriculture, food crops and fodder are to a certain point indispensable. These compete with cash crops like cannabis for scarce land. The diversity of income strategies employed by farmers, who do not only grow cannabis but also other cash crops, may also reflect small-scale variations in suitability of specific fields for specific crops. It should also be noted that cannabis has a comparatively long vegetation cycle. In other words, the field is “blocked” for an extended time when farmers could possibly grow several short-cycle crops such as vegetables.

Cannabis prices

Farm-gate prices of cannabis garda

Differences in the farm-gate price of cannabis resin (garda) reflect different garda qualities and regional differences. Prices reported by farmers during the survey are referred to as first, second and third garda. Prices reported from the North/North-eastern region were higher for all garda qualities compared to other regions.

Most farmers sell their cannabis garda soon after harvest, i.e. in January. Hence, the January 2011 prices reported through the monthly price monitoring system were used to calculate farmers’ income and farm-gate value of cannabis production in 2010. The average price weighted by production was calculated to take into account the large regional price differences.

Table 6: Farm-gate prices of cannabis resin (garda) by region (US\$/kg), January 2011

Region	1 st garda (US\$/kg)	2 nd garda (US\$/kg)	3 rd garda (US\$/kg)
N/NE*	166	115	35
Other regions*	79	59	39
Average*	99	81	49
Average (weighted) **	86	66	39

* Simple average of provincial averages in this region. ** Average weighted by cannabis production.

Source: 1st garda prices: MCN/UNODC monthly price monitoring report, January 2011. 2nd and 3rd garda prices: own calculations based on the cannabis survey 2010.

Regional differences in cannabis garda prices

Between January 2006, when a regular price monitoring started, and January 2011, the monthly farm-gate prices of cannabis garda⁹ showed large changes both within and across regions. From 2009 until March 2010, prices in all regions were relatively stable. But at some point in March 2010, prices started to increase for several months in all regions. The largest increase in prices was reported in Badakhshan, Balkh and Takhar provinces. As there is no standard garda quality, it is not possible to determine to what extent cannabis garda prices reflect changes in the garda quality or changes in the market.

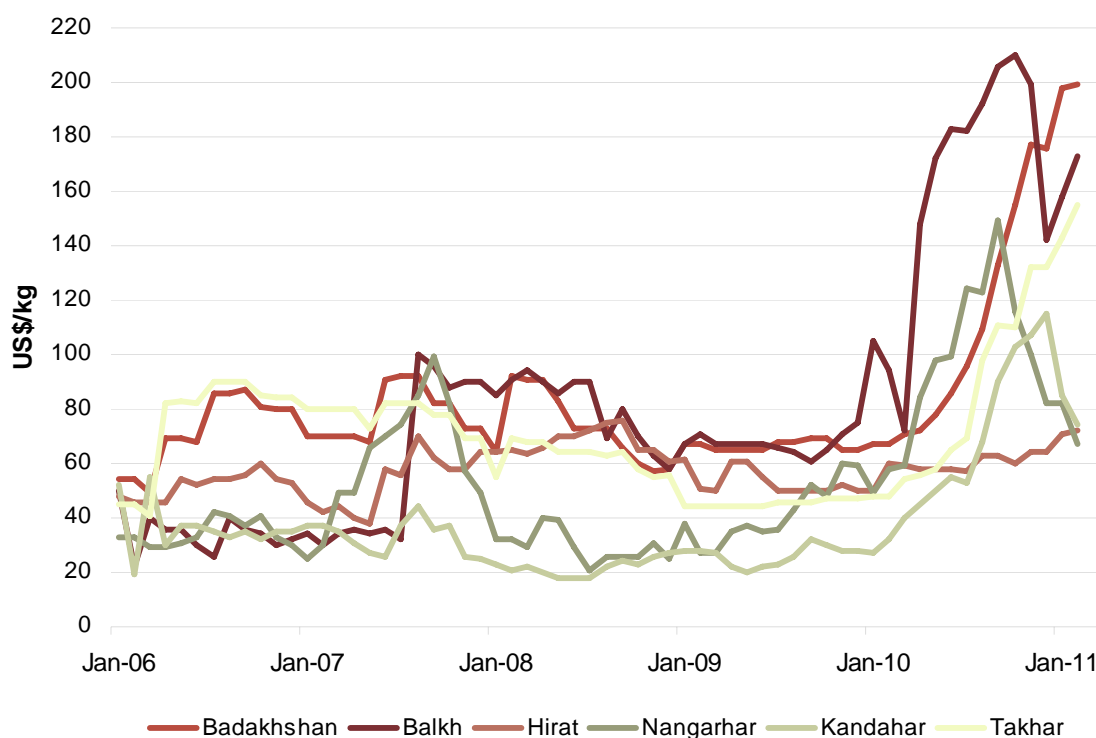
In Kandahar (Southern region) and Nangarhar (Eastern region), cannabis prices decreased after the 2010 harvest but were still much higher than the previous year. A similar downward trend could not be observed in the Hirat (Western region) and Badakhshan and Takhar (North-eastern region) where prices continued to climb even after the harvest. Prices in the Balkh (Northern region), after a peak towards the end of 2010, decreased at around harvest time but then started to increase again. Cannabis farm-gate prices are certainly determined by many different factors, not only by the dynamics of supply (new harvest) and demand (of traders). Still, it seems that in the Eastern and Southern regions the availability of the new harvest

⁹ Only 1st garda quality is regularly monitored.

contributed to a fall in prices which however remained higher than the previous year. In the other regions, such a seasonal effect was not observed or at least not as clearly. The fact that the decrease in cannabis yield was much more pronounced in the Northern and North-eastern region compared to other regions would support the assumption that the absence of a seasonal price dip in the North-eastern region corresponds to an unmet regional demand for cannabis. The post-harvest price dip in the Northern region was also weak and short-lived.

Given the multitude of cannabis products available on the market, the dynamics of cannabis prices need to be supplemented by additional information on the types of products and trafficking patterns which are currently not available.

Figure 24: Monthly farm-gate prices of cannabis garda (best quality, 1st garda) by region, Jan. 2006 – Feb. 2011

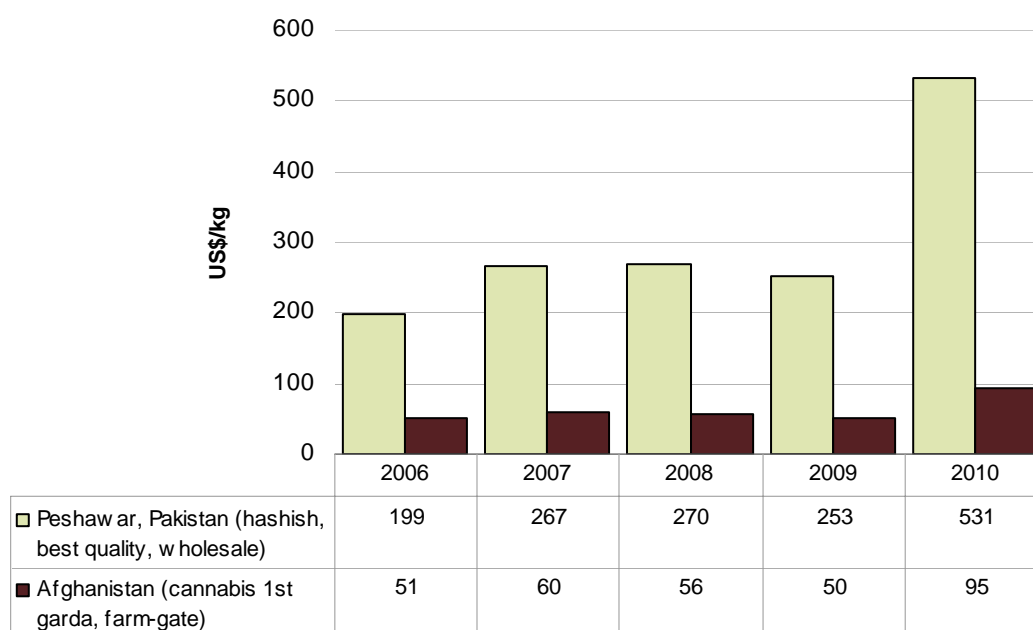


Source: MCN/UNODC monthly price monitoring system

Farm-gate prices of hashish

Headmen in practically all cannabis-cultivating villages reported farm-gate prices for hashish. This indicates that in all villages some farmers process cannabis garda into hashish, locally also called *charas*. However, interviews with farmers during the yield observation survey revealed that most farmers do not produce hashish but sell cannabis garda. Out of 39 farmers interviewed during the yield observation survey, only 18 produced hashish.¹⁰ The conversion from garda to hashish requires a considerable input of labour and/or the availability of machines, which need access to electricity and are not easily available in the rural area. These machines are therefore usually used by traders rather than by farmers explaining why most farmers do not process cannabis garda into hashish, despite the increase in value.

¹⁰ The exact proportion of farmers engaged in converting cannabis garda into hashish or the quantity of garda being processed by farmers could not be quantified as this was not part of the main survey questionnaire.

Figure 25: Average annual prices of cannabis products in Pakistan and Afghanistan, 2006-2010

Source: MCN/UNODC monthly price monitoring.

Note: The price for cannabis garda in the graph refers to the annual average price (simple average of all regions) and differs from the weighted average price at the time of resin processing.

The average wholesale price of best quality hashish in Peshawar, Pakistan (US\$ 531/kg) in 2010 was over six times the farm-gate price of cannabis resin (garda) at the time of resin processing in Afghanistan (US\$ 86/kg). This price difference is higher than for opium, which was traded at US\$ 261/kg in Peshawar while the farm-gate prices of dry opium at harvest time was US\$ 169/kg.

The different prices reported for hashish grading seem to reflect different cannabis garda qualities (1st, 2nd and 3rd garda). Hashish prices at the farm-gate were 1.1 times more than the price of 1st and 2nd cannabis garda (powder) and 1.2 times more than the price of 3rd garda. This relatively small increase in value for processing garda powder into hashish, may explain why most farmers do not engage in this activity and prefer to sell unprocessed garda powder.

Table 7: Farm-gate hashish price as proportion of cannabis garda powder price (US\$/kg)

Region	1 st garda hashish (US\$/kg)	2 nd garda hashish (US\$/kg)	3 rd garda hashish (US\$/kg)
N/NE	1.0	1.0	1.0
S-E-W-C	1.1	1.1	1.2
Average	1.1	1.1	1.2

Note: Calculated from headmen's responses at the time of the survey.

Cannabis resin seizures in Afghanistan and neighbouring countries

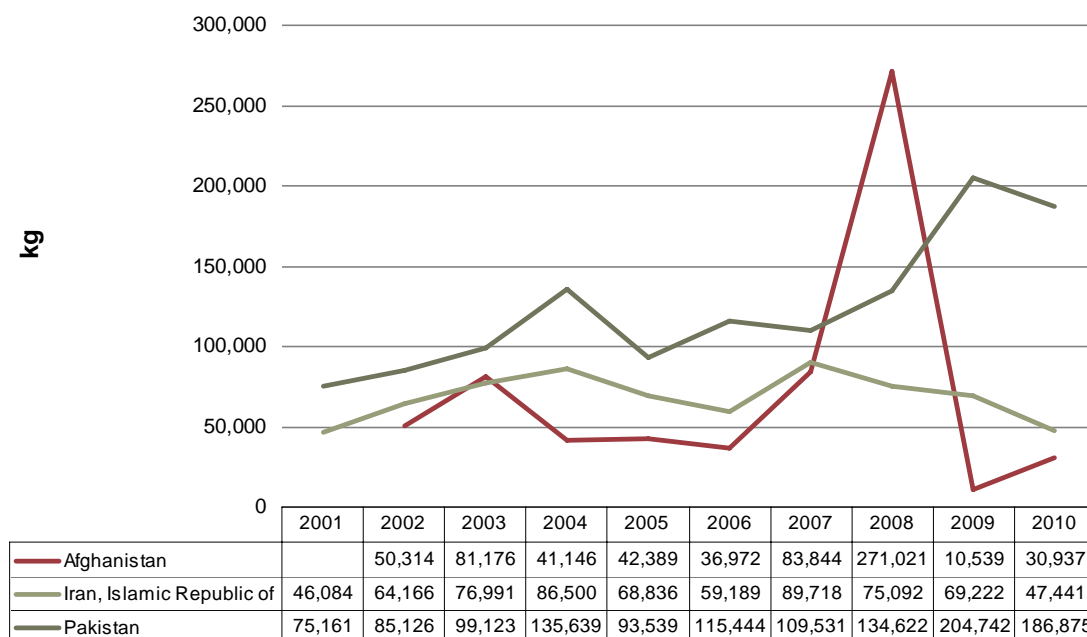
The 2010 cannabis survey indicates a relative stability in terms of cannabis cultivation. No direct, quantitative estimate is available for cannabis cultivation and production before 2008 but the question remains on the levels before 2009 and their trends.

Drug seizure trends do not directly reflect trends in drug production as they depend on many factors such as law enforcement strategies and priorities, trafficking dynamics, and, sometimes, chance. Thus, they should be interpreted with caution.

Nevertheless, over the years, seizures of cannabis in Afghanistan and neighbouring countries should reflect large-scale changes in production levels assuming that there was no significant change in law enforcement

activities. Such changes, if they happened, would manifest themselves on a delayed basis in seizure trends, e.g. resin production from one year normally enters the market at about January of the following year. Unlike the case with opium, it is thought that farmers do not store cannabis *garda* for more than several months. Thus, it seems reasonable to assume that the complete cannabis resin production from a specific year enters the market as hashish in the following 12 months when it would be “visible” in seizures. It is important to note that cannabis produced in 2009 would most probably appear in seizures at the earliest in 2010. Therefore, the 2010 cannabis production is not yet represented in seizure figures and cannot be used as a point of comparison.

Figure 26: Cannabis resin seizures in Afghanistan, Iran and Pakistan (kg), 2001-2010



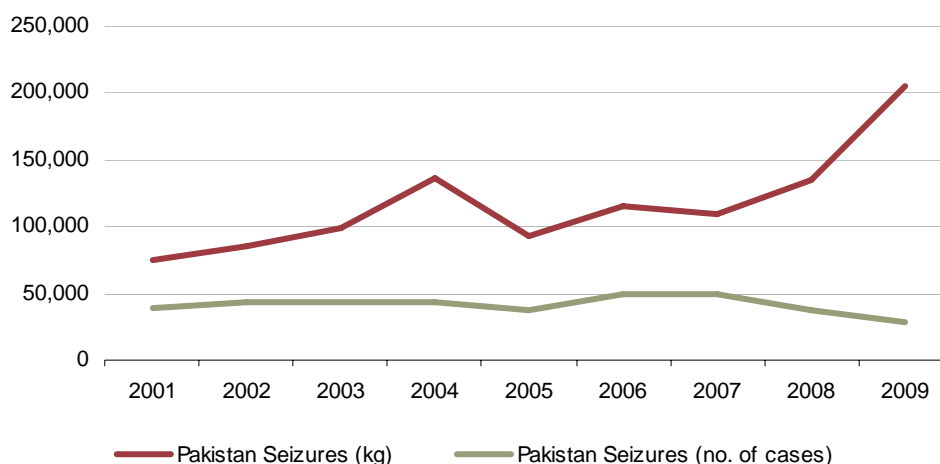
Source: Annual Reports Questionnaires, Government reports. The 2010 figure for Iran refers to the months January to October only and is provisional. No data was available for Afghanistan in 2001.

Most seizures of Afghan cannabis resin (hashish) in terms of volume (weight) are made within Afghanistan or its two neighbouring countries Pakistan and Iran. Between 2006 and 2010, on average, 305 mt of cannabis resin was seized in these three countries annually. This corresponds to 9% to 20% of the estimated potential cannabis production in Afghanistan in 2009. However, this average is heavily influenced by one single large seizure made in 2008 in Kandahar province, Afghanistan. Except for this exceptional seizure, cannabis resin seizures in Afghanistan since 2002 do not show a clear upward or downward trend.¹¹ Cannabis seizures in the three countries have all different trends which makes it difficult to identify a common underlining pattern which can explain production trends.

In Pakistan, cannabis resin seizures increased considerably between 2007 and 2009 and remained at a high level in 2010. In the 2006-2010 5-year period, seizures were much higher, on average 150 mt per year, compared to an average of 98 mt annually in the preceding 5-year period. However, parallel to the increase in cannabis resin seizure amounts, the number of seizure cases declined considerably between 2007 and 2009, and reached their lowest level since 2001. Obviously, in 2008 and 2009, Pakistan law enforcement agencies captured more large-scale resin shipments, which more than made up for the overall lower number of seizures made.¹²

¹¹ No data on cannabis resin seizures for 2001 is available for Afghanistan.

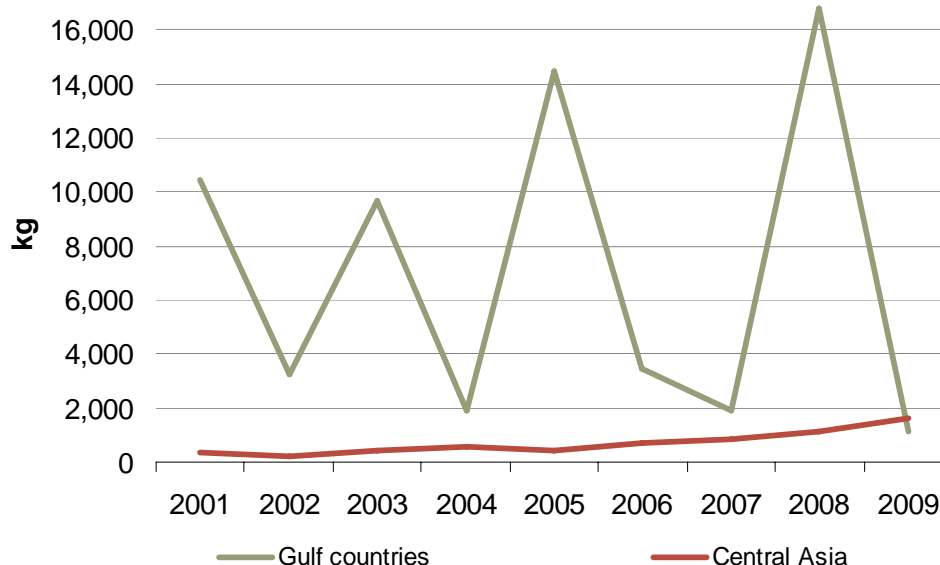
¹² Individual seizures reported to UNODC confirm this finding: in 2007, only 2% of cannabis resin seizure cases reported were equal to or larger than 1,000 kg, and these 2% accounted for 43% of total seizures by weight. In 2009, 4% of seizure cases were equal to or larger than 1,000 kg, and these 4% accounted for 72% of total seizures by weight.

Figure 27: Pakistan, cannabis resin seizure amounts (kg) and number of cases, 2001-2009

Source: Annual Reports Questionnaires.

Seizure trends of cannabis resin in Iran show a different pattern. Since 2007, resin seizures have declined steadily. The 2006-2010 5-year average amount of cannabis resin seized (68 mt) is practically the same as in the 2001-2005 5-year period (69 mt).¹³

Not all cannabis resin seized in the Gulf countries or in Central Asia is of Afghan origin. Furthermore, not all countries in these two regions report cannabis resin seizures every year and it is not known if no seizures were made or if seizures made were reported. These shortcomings aside, in Central Asia cannabis resin seizures between 2005 and 2009 increased every year. However, the total amount seized – less than 1 mt on average per year in that period – is small compared to the amount seized in Afghanistan, Iran and Pakistan.

Figure 28: Cannabis resin seizures (kg), 2001-2009

Source: Annual Reports Questionnaires. Figures for Central Asia do not include Tajikistan.

In the past decade, cannabis resin seizures in the Gulf region varied considerably from year to year and therefore a clear trend cannot be identified. On average, the annual amount of resin seized was larger between 2001 and 2005 (8 mt) than between 2006 and 2009 (6 mt).

¹³ For 2010, seizure figures in Iran refer to the months January to October only and are provisional. The final annual figure may be higher.

The interpretation of seizure trends in the three countries of Afghanistan, Iran and Pakistan is complicated by the fact that Pakistan reports that almost all the resin seized is of Afghan origin, whereas Iran reports that seizures partly originate from Afghanistan and partly from Pakistan. Thus, some of the Afghan cannabis resin reportedly reaches Iran via Pakistan, a route also known for opiate trafficking. However, an analysis of individual seizure data from Pakistan does not point to Iran as a destination country of cannabis resin shipments seized in Pakistan. Still, for a portion of individual seizures the destination country is not reported. That country could be Iran.¹⁴

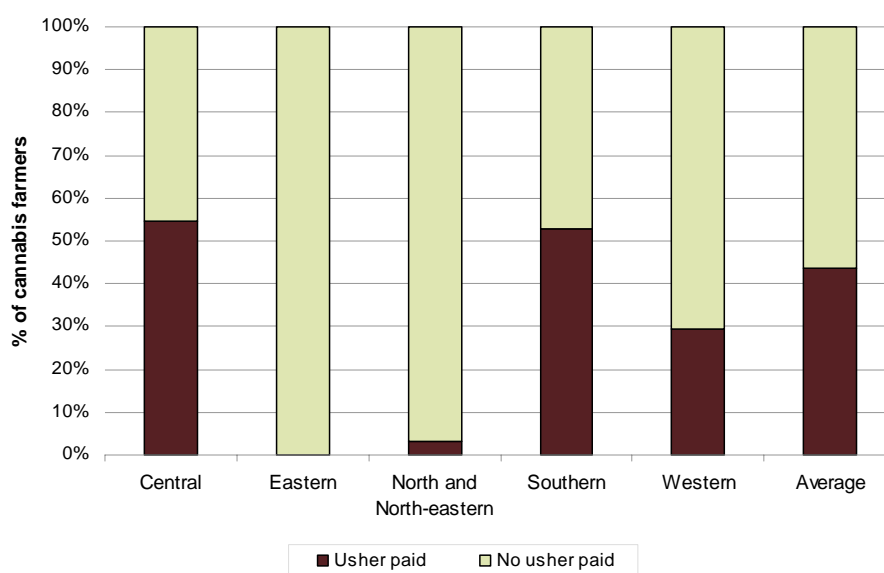
Taking these considerations into account, the diverging seizure trends in Iran and Pakistan could be due to a change in trafficking routes, a change in trafficking volume or both. To a certain extent, there seems to be some compensation between falling seizure levels in Iran and rising seizures levels in Pakistan. The diverging trend between seizure cases and kilogramme amounts observed in Pakistan since 2007 could indicate a change in trafficking structures to fewer but larger shipments. However, more information is needed to get a clearer picture of the trafficking situation.

All in all, cannabis resin seizure trends in the region are diverse and their interpretation with regard to potential cannabis production levels is extremely complicated. The information available does not necessarily indicate that cannabis production levels, as reflected in seizures, changed significantly from the first half of the 2000 decade and the second, nor did a clear seizure trend emerge in the region.

Payment of tax on cannabis (usher)

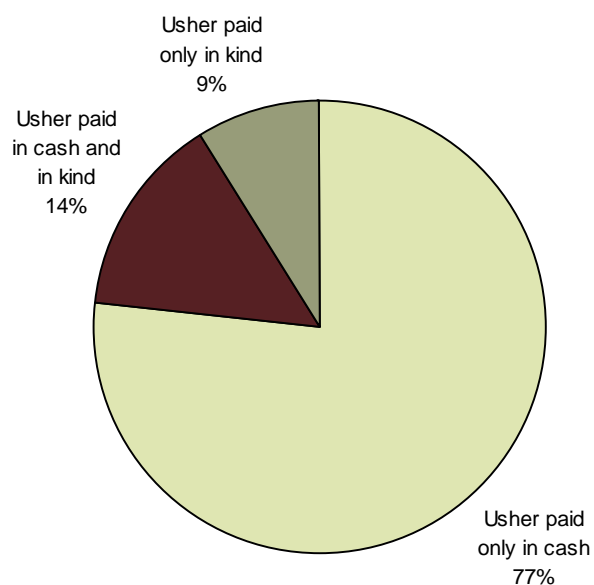
Usher is an informal tax of about 10% of the value of agricultural products paid by farmers to groups which control territories in rural Afghanistan. Slightly less than half of cannabis farmers (44%) reported paying usher on their cannabis production. There were strong regional differences: More than 50% of cannabis farmers in the Southern and Central regions reported paying usher, while few farmers in the Northern, North-eastern regions paid usher. In the Western region about 30% of farmers reported paying usher and no usher payment was reported in the Eastern region. This regional pattern is similar to the usher payment pattern reported in the Annual Opium Survey 2010 where mostly farmers in the Southern region reported paying usher on opium, compared to only a small proportion of farmers in other regions.

Figure 29: Payment of usher by region reported by cannabis farmers in 2010 (n=333)

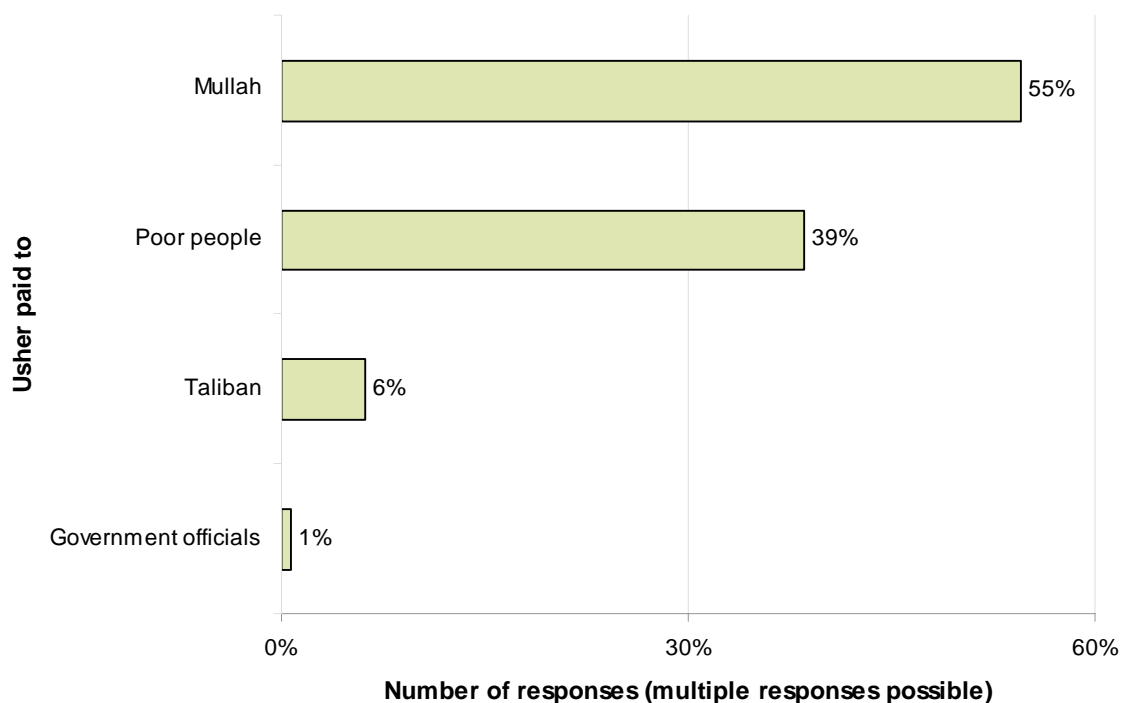


More than two thirds of the affected cannabis farmers reported paying usher only in cash, while 14% reported paying usher in cash as well as in kind, and 9% reported paying usher only in kind.

¹⁴ Source: UNODC Individual Seizure Database (IDS).

Figure 30: Type of usher payment made by cannabis farmers (n=145)

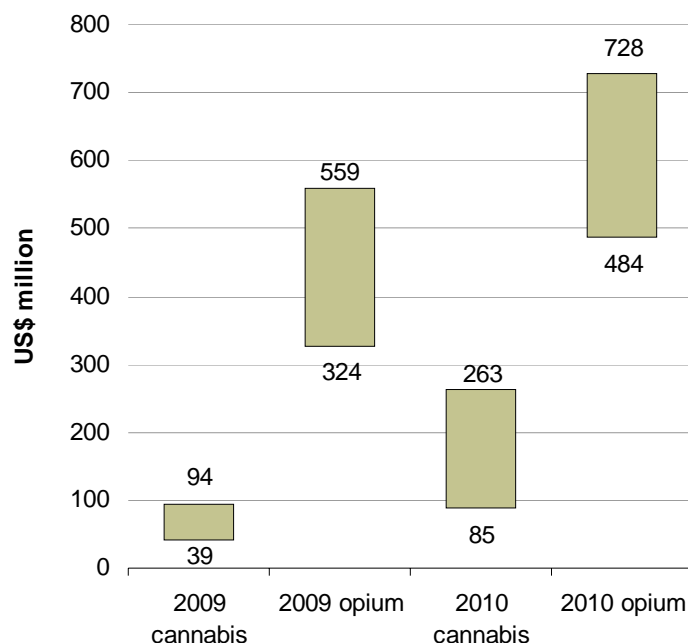
More than half of cannabis farmers (55%) reported paying usher to their Mullah, 39% to poor people, 6% to the Taliban and only 1% to Government officials.

Figure 31: Recipients of usher payment as reported by cannabis farmers (n=145)

Farm-gate value of cannabis resin production

The farm-gate value of cannabis resin production in 2010 was estimated to range between US\$ 85 million and US\$ 263 million. The farm-gate value of cannabis production corresponds to 0.7% to 2.0% of the 2010 Afghanistan GDP. This is still much lower than the farm-gate value of opium production. However, comparing 2009 with 2010, the difference between the farm-gate value of cannabis and opium is shrinking.

Figure 32: Farm-gate value of cannabis resin and opium production (US\$ million), 2009 and 2010



Note: the bars indicate the upper and lower bound of the estimation ranges.

Source: MCN/UNODC Afghanistan opium surveys 2009 and 2010, MCN/UNODC Afghanistan cannabis survey 2009.

3 METHODOLOGY

The survey had three main components:

- A questionnaire survey in a sample of villages, randomly selected under an area frame sampling approach, with interviews of village headmen and three farmers per village.
- A remote sensing survey using a sample of satellite images, randomly selected under an area frame sampling approach.
- A yield observation survey, which investigates cannabis yield per field, harvest and processing of cannabis.

Information from different survey instruments was complemented by information from the monthly price monitoring system, which also covers cannabis resin, and from the Annual Opium Surveys where appropriate.

Survey components

Village survey

The sampling follows the guidelines of an area frame sampling design. An area frame sampling design is a widely used methodology in agricultural statistics. For the aims of this survey the following steps were carried out.

Construction of the sampling frame: The purpose of stratification in any survey is to reduce the variance of the variables under study in each stratum. The village frame is a list of villages compiled by The Central Statistical Office in Afghanistan and AIMS. It contains the village name, district name, province name, location, number of households, and average household size. It has 41,419 villages in total.

By consultations with survey coordinators in Afghanistan, it was concluded that several provinces in Afghanistan have little or almost null cannabis cultivation. In order to optimize resources, it was decided to exclude these provinces from the sampling frame. Hence, only 22 out of the 34 provinces in Afghanistan were targeted as potential areas with cannabis cultivation (cannabis risk area).

Considering only the cannabis risk area, the sampling frame consists of 25,526 villages.

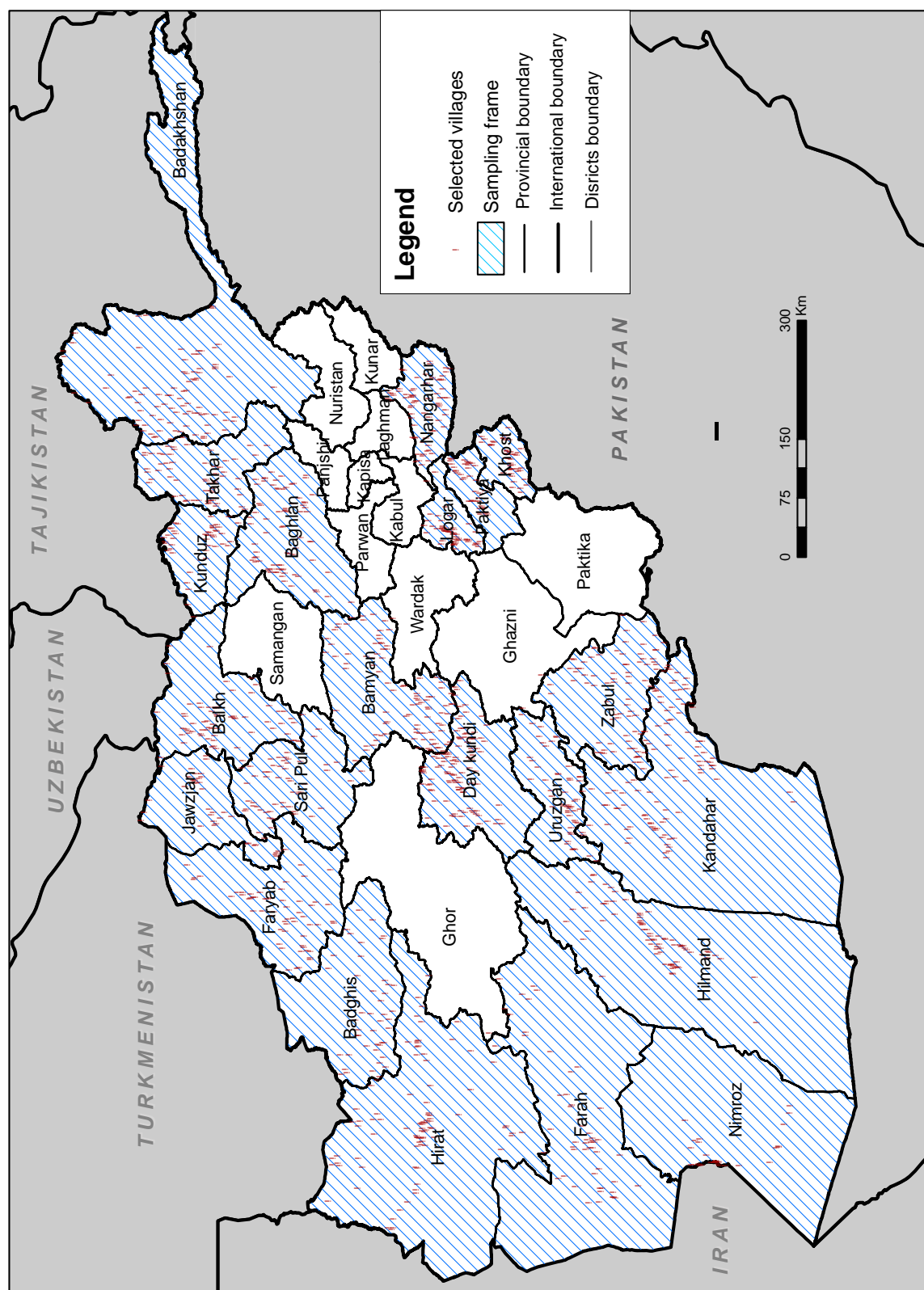
Sample size: More than one item or characteristic is usually measured in surveys and often the number is large. If a desired degree of precision is prescribed for each item, the sample size calculations lead to a series of conflicting values for n (see Cochran, Wiley 1977 for formulae). To determine the sample size for the cannabis survey in Afghanistan, two constraints were considered. First, it was assumed that not much about the amount of cannabis cultivation was known. Second, there is a budget constraint due to field and operations costs, limiting the village survey to cover up to 1,529 villages.

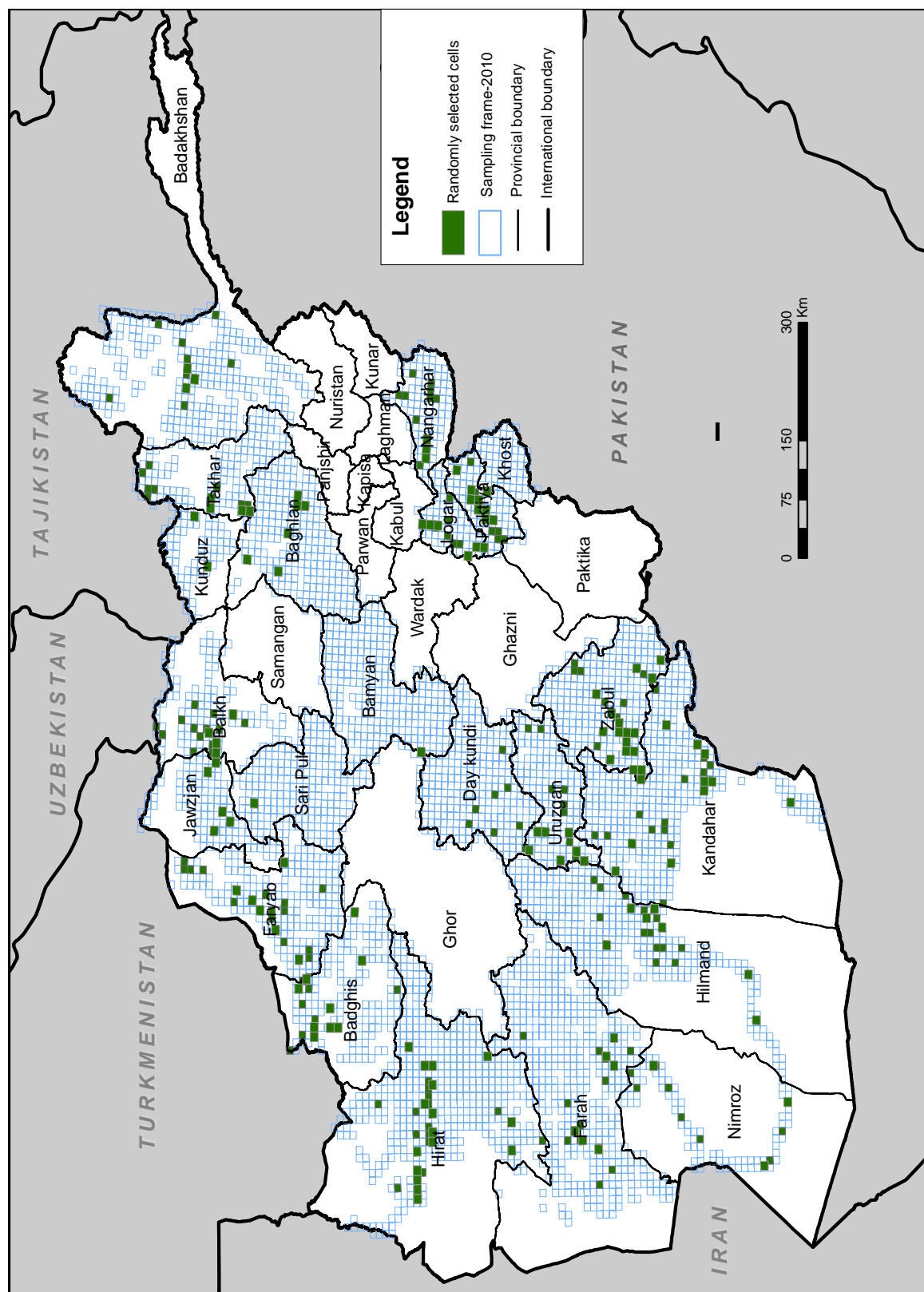
Data collection and data entry

The village survey was carried out by experienced surveyors of UNODC/MCN Afghanistan under the close supervision of UNODC/MCN Survey Coordinators, who have also been involved in the opium poppy survey for many years. The methodology of the cannabis survey 2010 covered various tools, such as the village survey through a questionnaire of different types of farmers: “cannabis growing”, “stopped cannabis growing” and “never grown cannabis”. The village survey also included interviews of 1,452 village headmen to understand the extent of cannabis crop cultivation and socio-economic factors behind cultivation. In addition to the village survey, other important methods such as ground truth collection for the imagery interpretation, area estimation of cannabis field as well as the growth calendar of the crop and yield survey. In fact, the survey methodology was based on a sampling approach and was combined with the use of satellite imagery and extensive field visits.

For this task, 129 surveyors visited 1,452 responsive villages out of a total of 1,529 sampled villages spread over 22 provinces and 232 districts. Altogether, 129 surveyors interviewed 4,356 farmers in the village survey.

Map 4: Cannabis risk area and selected villages for the cannabis village survey, 2010





The data was collected by the trained surveyors through the questionnaire prepared for interviewing farmers cultivating cannabis, farmers who stopped cultivating cannabis, farmers who had never grown cannabis and headman of the village to know his perception regarding cannabis cultivation. The questionnaire also covered socioeconomic aspects of farmers, reasons for growing, accessibility of loans for the crop and other licit crops, access to other financial institutions and other aid organizations in the area. All the questionnaires were reviewed by the regional Survey Coordinators and sent to UNODC or MCN central survey section. The data were entered by the data clerks based in Ministry of Counter Narcotics (MCN) under the supervision of the Data Management Officer of UNODC, survey section.

Remote sensing survey

Twenty-two provinces were identified as associated with cannabis cultivation. Based on field reports and the 2009 cannabis survey, the level of cannabis cultivation in six provinces was expected to be too low for a sampling approach to be successful with the available means for acquiring satellite imagery. For these provinces, a targeting approach was used, i.e. based on field information, imagery was acquired over all areas from where current cannabis cultivation was reported. Out of the six provinces foreseen targeted, satellite images were only acquired over Baghlan. In the remaining five provinces, no cannabis cultivation was reported (Jawzjan, Sari Pul, Bamyan) or not enough information (Khost, Kunduz) was received to be able to target the fields with imagery.

In the remaining 16 provinces, a sampling approach was used. To increase the number of images and improve the sample, the image size was set to 8 km by 8 km. Total number of images that could be purchased was 180. Approximately 160 were available for sampling and 20 for targeted provinces. Very high resolution satellite images were acquired for the remote sensing survey.

Number of images by province for 16 sampled provinces determined by:

1. allocated proportional to square-root of irrigated area, with further condition of
2. minimum of 8 images per province

This gives a total of 169 sample images.

Cells crossing a boundary are assigned to the province in which they have the most irrigated area. Cells with less than 1 km² of irrigated land are excluded from selection, although they still contribute to total irrigated area in a province. Within each province, cells selected by PPS using irrigated area as a auxiliary variable. Because of replacement, and therefore the chance of a cell being selected more than once, 161 cells were eventually selected. With the exception of 2 images, all were acquired.

The final sample represents 7.0% (161/2298) of cells but 17.8% (331,801 ha / 1,868,332 ha) of total irrigated area over the 16 provinces.

In the 2009 and 2010 cannabis surveys, it was noticed that the active agricultural area identified on the imagery used for the cannabis survey was much smaller than the potential agricultural land (“ag mask”) based on which the sampling was done. The active agricultural land by definition is smaller than the potential agricultural land. However, the differences were larger than those observed in the poppy cultivation season. In 2009, e.g. some sample cells which had some potential agricultural land, did not contain any active agriculture at the time of cannabis cultivation. UNODC, together with academic partners, is undertaking research to better understand the year-to-year changes of the active agricultural land and differences between winter and summer agricultural seasons in Afghanistan.

Ground truth collection

Ground truth information (GPS points) was collected in Paktya, Baghlan and Logar provinces. In Nangarhar province ground truth information was collected through a segment survey (GPS points and field mapping). The collection of ground truth in most of the Southern region was difficult for the surveyors and survey coordinators.

Table 8: Sample and target provinces 2010

Province	Approach	No. of images sampled/acquired
Badakhshan	Sampled	8/8
Badghis	Sampled	8/8
Balkh	Sampled	13/13
Day Kundi	Sampled	8/8
Farah	Sampled	12/12
Faryab	Sampled	14/13
Hilmand	Sampled	13/13
Hirat	Sampled	15/15
Kandahar	Sampled	14/14
Logar	Sampled	6/6
Nangarhar	Sampled	10/10
Nimroz	Sampled	8/7
Paktya	Sampled	7/5
Takhar	Sampled	9/9
Uruzgan	Sampled	8/8
Zabul	Sampled	8/8
Total (sample)	16 provinces	161/157
Baghlan	Targeted	na/2
Bamyan	Targeted	na/0
Jawzjan	Targeted	na/0
Khost	Targeted	na/0
Kunduz	Targeted	na/0
Sari Pul	Targeted	na/0
Total (targeted)	6 provinces	2 images

na – not applicable. Note that the number of images actually sampled (161) is lower than the calculated sample size of 169 because of replacement and therefore the chance of a cell being selected more than once.

Cannabis Yield Observation Survey

Practical observations on yield processing were carried out during the cannabis harvest and cannabis garda processing with selected farmers. Forty-nine fields were identified, 39 of them with mono-crop cannabis, the others with cannabis in mixed cultivation. Farmers were interviewed on the yield obtained from a previously identified field, including all yield qualities, as well as on the cannabis extraction method used, cannabis seed yield, timing and duration of harvesting, drying, and garda extraction, people involved and hashish production.

Capacity building

UNODC and MCN Survey Coordinators and Assistant Coordinators were trained through the following training workshops:

- Training of trainers for Survey Coordinators (SC) and assistant survey coordinators of UNODC and MCN
- Training for surveyors hired by the SCs
- Training for data clerks on data cleaning procedure by the UNODC data programmer

Estimations

Area estimation

The estimated cannabis area in Afghanistan in 2010 is presented as a range, from 9,000 ha to 29,000 ha. The range expresses the uncertainty associated with the estimation.

The remote sensing survey was conducted with limited ground reference information available. Certain types of cannabis cultivation such as cultivation in kitchen gardens, mixed crops, and cannabis along field bunds are difficult or impossible to detect with the methodology applied. The amount of cannabis cultivation of these types could not be estimated. It is assumed that the best estimate of the remote sensing survey represents a minimum estimate. It was therefore used to establish the lower bound of the area estimation range.

The results from the remote sensing survey were used to calculate the lower bound of the range, with the exception of two provinces, Logar and Paktya. In Logar, cannabis is mainly cultivated on the bunds of fields, which could not be detected on satellite imagery. In Paktya, a relatively small variety was cultivated, with a low plant density. This pattern did not give a clearly identifiable signature and texture on the imagery. For these two provinces, the area estimate from the village survey was used for the calculation of the lower bound.

For the calculation of the upper bound the estimates from the village survey were used. Headmen report the number of cannabis growing households in the village, the area covered by cannabis in the village and the total number of households. Thus, the average cannabis area cultivated per household in each village could be calculated and extrapolated to the sampling frame.

Yield and production

Cannabis yield was estimated based on the results of the cannabis yield observation survey. This survey was conducted in January 2011, when farmers actually processed the harvested and dried cannabis plants to obtain cannabis resin. In January 2011, surveyors went to selected farmers and witnessed the cannabis resin (garda) production from these fields. The garda yield of different qualities was measured.

Yield information from 39 mono-crop cannabis fields was used for the estimate and used to calculate the average yield for all garda qualities separately. Regional differences exist in processing cannabis to obtain garda. This information was used to stratify the yield observations into two yield regions, one comprising the fields in the Northern and North-eastern and the other fields in the Southern, Eastern, Central and Western regions.

In general, in the North and Northeast of the country, the processing methods employed result in first garda of higher quality but less quantity, whereas in other regions a larger proportion of first garda is obtained, which however is of lower quantity (less resin and more plant material).

Cannabis production for all garda qualities was estimated by multiplying the average regional yield with the lower and upper value of the cannabis cultivation range, respectively.

For this purpose, it was assumed that 19% of cultivation took place in the N-NE region and 81% in the other regions of the cannabis risk area. These proportions correspond to the cannabis cultivation areas in these regions based on the results of the remote sensing survey.

Table 9: Cannabis garda production (mt), 2010

Yield region	Area proportion	1st garda (mt)	2nd garda (mt)	3rd garda (mt)	Total (mt)
N-NE	0.14	47	48	39	134
S-E-C-W	0.86	541	337	189	1,067
Total lower bound		588	385	228	1,201
Rounded					1,200
N-NE	0.14	147	150	121	418
S-E-C-W	0.86	1,686	1,049	588	3,323
Total upper bound		1,832	1,199	709	3,740
Rounded					3,700

Thus, total cannabis production including all garda qualities was estimated to range from 1,200 mt to 3,700 mt (rounded).

Cannabis-growing households

The number of cannabis-cultivating households was estimated from information provided by headmen in the sample villages on the number of households involved in cannabis cultivation compared to the total

number of households in the village. This number includes any kind of cannabis cultivation, i.e. it may include households which have only small-scale cannabis cultivation, e.g. in kitchen gardens.

The number of cannabis-cultivating households was estimated by calculating the proportion of cannabis-growing households for each surveyed village, and calculating the weighted average proportion of cannabis growing households per village for each province of the sampling frame (the cannabis risk area). The weights represent the probability of villages of being selected and included in the sample. The provincial averages were multiplied with the total number of households in that province to obtain the total number of cannabis-growing households per province. The sum of all provinces is the national estimate.

Farm-gate value of cannabis production

The farm-gate value is a function of average per hectare yield, area cultivated and average prices.

Similar to the methodology used in the Annual Opium Survey, the farm-gate value of cannabis was calculated based on the prices observed in the monthly price monitoring in the month of harvesting/garda production, when farmers can actually start selling their produce, which was January 2011. As the monthly price monitoring only collects prices of first garda, second and third garda prices were calculated from the average price difference between first and second and first and third garda reported by headmen in the village survey. The first garda price of the yield regions used in this report were calculated as the simple average of the provincial prices reported in the price monitoring report.

Table 10: Prices of 2nd and 3rd garda reported by headmen as proportion of 1st garda, 2010

Yield region	Garda 2/garda 1	Garda 3/garda 1
N-NE	0.7	0.2
S-E-C-W	0.7	0.5

Table 11: Farm-gate prices of cannabis, January 2011

Yield region	1st garda (US\$/kg)	2nd garda (US\$/kg)	3rd garda (US\$/kg)
N-NE	166	115	35
S-E-C-W	79	59	39

N-NE: Simple average of Badakhshan, Balkh, Takhar. S-E-C-W: simple average of Hirat, Kandahar, Nangarhar.

Table 12: Farm-gate value of cannabis production (US\$), 2010

Yield region	1 st garda (US\$)	2 nd garda (US\$)	3 rd garda (US\$)	Total (US\$)
N-NE	7,810,096	5,529,901	1,361,312	14,701,309
S-E-C-W	42,768,324	19,717,137	7,427,087	69,912,547
Total lower bound				84,613,856
Rounded				85 million
N-NE	24,321,422	17,220,668	4,239,263	45,781,353
S-E-C-W	133,184,854	61,401,144	23,128,694	217,714,692
Total upper bound				263,496,045
Rounded				263 million

The total farm-gate value of cannabis resin (garda) in 2010 was estimated to range between US\$ 85 million and US\$ 263 million (rounded).

Income from cannabis

The potential gross income per hectare from cannabis resin was calculated based on regional prices and regional yields, using the regional divisions described above. The gross income does not take into account expenditures, and is the potential cash income individual farmers would get if they sold the total resin produced in January 2011. The weighted average was calculated using the proportions of regional cannabis cultivation from the remote sensing survey as weights.

Table 13: Gross income from cannabis resin per hectare (US\$/ha), 2010

Region	1st garda (US\$/ha)	2nd garda (US\$/ha)	3rd garda (US\$/ha)	Total (US\$/ha)
N-NE	5,787	4,098	1,009	10,894
S-E-C-W	5,326	2,456	925	8,707
Weighted national average*				9,022
Rounded				9,000

** Weighted by proportion of cannabis cultivation per region.*

Farmers reported in the village survey an average of 0.33 ha of cannabis cultivation per household. Using this figure and multiplying it by the per hectare income, on average, in 2010 cannabis-farming households had a cash income of US\$ 3,000.

ANNEX:

Cannabis garda processing in Logar province



Cannabis plants with seeds being ready for resin (garda) processing in Mohammad Agha district of Logar province



Cannabis plants broken in to pieces being ready for resin (garda) processing in Mohammad Agha district of Logar province



Cannabis plant stored inside the room



Cannabis resin (garda) after conversion processing



Cannabis seeds separated from resin (garda)



Cannabis stems after separation from garda and seeds

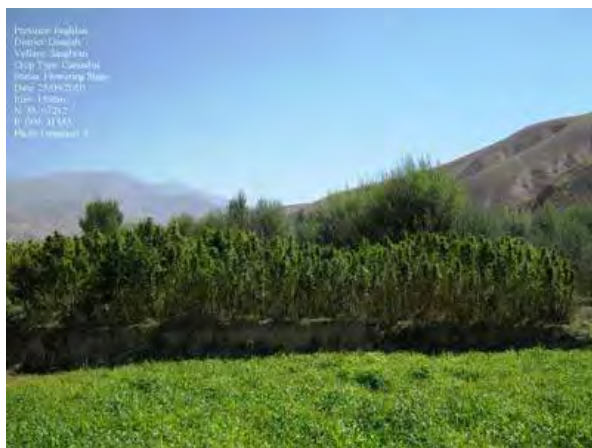
Pictures of cannabis fields at flowering stage



Cannabis on bunds at flowering stage in Deh Salah district of Baghlan province



Cannabis as mono-crop at flowering stage in Deh Salah district of Baghlan province



Cannabis on bunds at flowering stage in Deh Salah district of Baghlan province



Cannabis at flowering stage in Deh Salah district of Baghlan province



Cannabis at flowering stage in Deh Salah district of Baghlan province



Cannabis at flowering stage in Deh Salah district of Baghlan province