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# Characteristics of cannabis cultivation in New Zealand and Israel

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## Abstract

**Purpose** – *The purpose of this paper is to explore the characteristics of small-scale cannabis cultivation in New Zealand and Israel.*

**Design/methodology/approach** – *An online survey of predominantly small-scale cannabis cultivators had previously been conducted in 11 countries in 2012/2013. The same core online survey was subsequently conducted in New Zealand and Israel in 2016/2017, and comparisons made with the original 11 countries.*

**Findings** – *Only around one third of the New Zealand and Israeli cannabis growers had sold cannabis, and the majority of these did so only to cover the costs of cultivation. The median number of cannabis plants cultivated per crop by the New Zealand and Israeli growers was five and two, respectively. The leading reasons provided for growing cannabis by both the New Zealand and Israeli growers were to provide cannabis for personal use and to share with others. A higher proportion of New Zealand than Israeli growers reported growing cannabis for medicinal reasons. A total of 16 per cent of the New Zealand and 17 per cent of Israeli growers had come into contact with the police due to their cannabis cultivation. The findings suggest small-scale cannabis cultivation in New Zealand and Israel is largely a means of “social supply” of cannabis, and this is consistent with the findings from the original 11 countries. The higher incidence of growing cannabis for medicinal purposes in New Zealand may reflect the limited official access to medical cannabis. Significant minorities of small-scale cannabis growers in both countries had contact with police, putting them at risk of the negative consequences of a criminal conviction.*

**Originality/value** – *To date, the research into cannabis cultivation has largely consisted of studies of individual countries. However, given the global popularity of cannabis use, and the recent spread of cannabis cultivation to countries that traditionally have not produced cannabis, via utilisation of indoor growing techniques, there is now a strong case for international comparative research. Following the success of the surveys in the original 11 countries, New Zealand and Israeli members of the Global Cannabis Cultivation Research Consortium international collaboration chose to undertake surveys in their own countries in 2016/2017.*

**Keywords** *New Zealand, Israel, Cannabis cultivation, Cannabis, Online survey, Cannabis policy*

**Paper type** *Research paper*

## Introduction

Until recently research into cannabis cultivation has largely consisted of studies of individual countries (e.g. Nguyen and Bouchard, 2010; Potter and Dann, 2005; Weisheit, 1991; Belackova and Vaccaro, 2013; Belackova *et al.*, 2015; Bouchard, 2007; Bouchard *et al.*, 2009; Decorte, 2008, 2010; Douglas and Sullivan, 2013; Hakkarainen, Frank, Perälä and Dahl, 2011; Hakkarainen, Perälä and Metso, 2011; Hammersvik *et al.*, 2012; Malm, 2006; Plecas *et al.*, 2005; Potter, 2010; Weisheit, 1992; Wilkins and Casswell, 2003). However, given the global popularity of cannabis use, and the recent spread of cannabis cultivation to countries that traditionally have not produced cannabis, via the utilisation of indoor growing techniques, there is now a strong case for international comparative research (INCB, 2013, para. 69, Potter *et al.*, 2011). This was the rationale for setting up of the Global Cannabis Cultivation Research Consortium (GCCRC) and the undertaking of a series of online surveys of predominately small-scale cannabis cultivators in 11 different countries in 2012/13, using the same methodology and questionnaire (i.e. Canada, USA, Belgium, Denmark, Finland, Germany, Austria, German-speaking Switzerland, the Netherlands, UK, and Australia) (Potter *et al.*, 2015; Barratt *et al.*, 2015).

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These surveys found a great deal of similarity in small-scale cannabis growing across countries in terms of the demographic characteristics of growers, methods and scale of growing operations, reasons for growing cannabis, use of cannabis and other drugs, participation in cannabis and other drug markets, and contact with the criminal justice system (Potter *et al.*, 2015). A majority of the small-scale cannabis cultivators were primarily motivated by reasons other than making money from cannabis supply, and had minimal involvement in drug dealing or other criminal activities (Potter *et al.*, 2015).

Following the success of the surveys in the original 11 countries, New Zealand and Israeli members of the GCCRC international collaboration chose to undertake surveys in their own countries in 2016/2017. New Zealand and Israel both have relatively small populations (i.e. 4.8 and 8.8 million), but are located in different parts of the world, with different climatic and growing conditions, and also different legal and political regimes. While the recreational use of cannabis is illegal in both countries, Israel has a long-standing and well-developed medical cannabis programme. There are eight legal medical cannabis growers in Israel. These are all licenced private companies who supply cannabis to approximately 28,000 licenced medical cannabis patients. Annual rates of recreational cannabis use have traditionally been relatively low in Israel, but recent data suggest that recreational use has increased significantly in recent years (Harel-Fisch, 2017). In contrast, in New Zealand, there is only limited official access to medicinal cannabis, and a long history of fairly high rates of recreational cannabis use by international standards (Wilkins, 2016; Wilkins and Sweetsur, 2008). The most recent New Zealand national survey found 11.6 per cent of the adult population reported using cannabis in the past year, and this had not significantly changed over the previous 10 years (Ministry of Health, 2018).

This paper reports the findings from the New Zealand and Israeli surveys, and discusses differences and similarities with the findings from the surveys of the 11 original countries.

## Methods

The methodology used by GCCRC has been described in some detail elsewhere (Barratt *et al.*, 2012; Barratt *et al.*, 2015; Decorte *et al.*, 2011). Briefly, following online surveys of cannabis cultivators in Belgium (Decorte, 2010) and Denmark and Finland (Hakkarainen, Frank, Perälä and Dahl, 2011), the GCCRC developed a standardised online survey to allow comparisons between countries who subsequently conducted the online survey (Decorte *et al.*, 2012). The resulting 26 item core ICCQ includes modules on: experiences with growing cannabis; methods and scale of growing operations; reasons for growing; personal use of cannabis and other drugs; participation in cannabis and other drug markets; contact with the criminal justice system; involvement in other (non-drug-related) illegal activities; and demographic characteristics.

The online surveys were promoted in participating countries via a range of channels including the GCCRC project website ([www.worldwideweeder.nl](http://www.worldwideweeder.nl)), Twitter™, online forums, Facebook™ groups, mainstream media, alternative media, flyers, street press, festivals and grow shops. Many of these strategies were international, leading people to the project website ([www.worldwideweeder.nl](http://www.worldwideweeder.nl)) where they could then choose the survey and language associated with their country of residence (see Barratt *et al.*, 2015). In New Zealand, the survey was promoted in close collaboration with National Organisation for the Reform of Marijuana Laws (NORML) New Zealand who posted the link to the survey on their website along with background information about the research and GCCRC. Flyers were also distributed at cannabis protest events (e.g. “J day”). In Israel, the survey was promoted by the moderator of the Israeli Cannabis Magazine ([www.קנאביס.com](http://www.קנאביס.com)), the most popular online cannabis information source in Hebrew. No financial incentive was provided to those who participated in the surveys to reduce the likelihood of fraudulent responses.

### Selecting eligible samples

Not all respondents to the surveys have been included in the data presented here. Three rules were used to determine eligible samples:

1. Respondents answered three eligibility questions at the beginning of the questionnaire. These were: aged 18 years or over; resided in the country of the survey; and reported that they had grown cannabis at least once.

2. Q3 of the ICCQ asked “how long ago did you last grow cannabis?” In order to reflect only recent trends in growing, we have excluded the participants who reported last growing cannabis more than five years ago and those who did not know, refused or skipped this question.
3. The samples reported here completed at least half of the core ICCQ questions. (i.e. 14 or more of the 26 core ICCQ questions).

After applying these rules, we are left with a final sample of 202 respondents from New Zealand and 367 respondents from Israel. A total of 6,530 respondents completed the survey from the original 11 countries (i.e. Canada = 63, USA = 645, Belgium = 1,065, Denmark = 814, Finland = 1,179, Germany = 1,348, Austria = 129, German-speaking Switzerland = 101, the Netherlands = 277, UK = 418, and Australia = 491).

## Findings

### *Demographics characteristics*

In total, 95 per cent of the Israeli respondents were male. (Table I). This is broadly consistent with the approximately 90 per cent male respondents in the original 11 countries. In contrast, New Zealand had a noticeably higher proportion of female respondents (i.e. 21 per cent)

The median age of the New Zealand sample was 38 years old, compared to 26 years for the Israeli sample. The New Zealand sample was older than even the Australian (35 years), Danish (31 years), Dutch (32 years) and British (33 years) respondents. The Israeli sample was younger and closer to the Swiss (25 years), Austrian (25 years), German (26 years), Finnish (26 years), Canadian (25 years), US (26 years) and Belgian (26 years) respondents. These differences in the age of samples may reflect differences in the recruitment strategies for each survey. For example, the Belgian, German, Austrian and Swiss surveys recruited a higher proportion of students. Respondents from both New Zealand and Israel were much more likely to be in some form of employment than receiving social welfare benefits, and this is broadly consistent with the patterns of employment found in the other 11 countries.

### *Growing experiences*

The Israeli growers were relatively inexperienced at cannabis cultivation compared to many of the other country samples, with only 6 per cent reporting they had grown 11 or more cannabis crops (Table II). The next most inexperienced groups of growers were from Belgium, where 11 per cent

**Table I** Gender and age

		<i>New Zealand</i>	<i>Israel</i>	<i>11 combined</i>
Gender (%)	Male	79	95	92
	Female	21	5	8
	Total <i>n</i>	171	274	6,200
Age	Median	38	26	27
	Range	18-81	18-74	18-86
	Total <i>n</i>	170	280	6,228
Employment status (% <sup>a</sup> )	Full-time work	47	51	41
	Part-time or casual work	11	20	12
	Self-employed	–	22	12
	Student (any type)	11	20	27
	Unemployed – looking for work	10	7	7
	Benefits/pension/disability	9	1	6
	Home duties	9	1	2
	Retired	6	–	3
	Not seeking work	–	1	3
	Total <i>n</i>	159	292	4,679

**Note:** <sup>a</sup>Respondents invited to tick more than one option; columns can total more than 100 per cent

**Table II** Number of crops grown and attempts before first successful grow

		New Zealand	Israel	c11 combined
How many crops ever grown? (% <sup>a</sup> )	I have not yet harvested my first crop	6	2	7
	1 crop	8	33	15
	2-5 crops	37	47	42
	6-10 crops	15	12	17
	11-20 crops	11	3	10
	21-50 crops	11	1	6
	More than 50 crops	12	2	4
	Total <i>n</i>	198	316	6,271
How many times did you fail before you succeeded in getting a crop? (% <sup>a</sup> )	Succeeded first time	60	63	67
	1 attempt	16	21	16
	2 attempts	10	10	7
	3 attempts	4	3	2
	4 attempts	2	1	1
	5 or more attempts	2	1	1
	I have not yet harvested my first crop	6	2	7
	Total <i>n</i>	194	360	6,303

**Note:** <sup>a</sup>Columns can total more than 100 per cent due to rounding

had grown 11 or more crops. In contrast, the New Zealand sample of growers was particularly experienced, with 34 per cent having grown 11 or more crops. Only the Danish, British and Australian respondents reported similar levels of experience (i.e. 30, 31 and 33 per cent, respectively). This may reflect the older age of respondents from these countries. The majority of respondents from all countries reported successfully cultivating cannabis on their first attempt, including 60 per cent of the New Zealand and 63 per cent of the Israeli growers.

### Growing method and scale

Only approximately one third of New Zealanders reported growing cannabis indoors (34 per cent), similar to levels reported in Belgium (34 per cent), Australia (27 per cent), Denmark (39 per cent), the Netherlands (33 per cent) and Switzerland (32 per cent). In contrast, respondents from other countries was much more likely to grow indoors including the USA (80 per cent), UK (76 per cent), Canada (68 per cent) and Finland (62 per cent) (Table III). Israel was somewhat in the middle of these two extremes, with 53 per cent reporting growing indoors. Many respondents in each country reported some combination of indoor and outdoor growing.

**Table III** Location, size of crop and yield per plant

		New Zealand	Israel	11 combined
Do you typically grow indoors or outdoors?(% <sup>a</sup> )	Indoors	34	53	49
	Outdoors	25	24	20
	Both indoor and outdoor in the same growing period	27	14	21
	Seedling grown indoors, then planted outdoors	14	9	10
	Total <i>n</i>	198	328	5,811
Number of mature plants per crop <sup>b</sup>	Median	5	2	5
	Range	1-100+	0-101	1-100+
	Total <i>n</i>	193	341	5,275
Typical yield per plant (ounces)	Median	3	1.4	1.4
	Total <i>n</i>	98	304	4,174

**Notes:** <sup>a</sup>The percentage may not total 100 due to rounding; <sup>b</sup>only respondents who have harvested at least one crop and reported growing one or more mature plants per crop were included in this analysis. This table only shows those respondents who have harvested at least one crop

The New Zealand and Israeli growers reported fairly low numbers of mature cannabis plants per crop (i.e. five and two, respectively), and this was broadly consistent with the other 11 countries. The highest median number of plants reported per crop was only nine plants, as reported in Austria and Switzerland.

The median yield (i.e. “usable dried cannabis”) reported per plant was three ounces among the New Zealand growers and 1.4 ounces among the Israeli growers. The overall median yield per plant for the original 11 countries was 1.4 ounces. The Australian (3.0 ounces) and, to a lesser extent, Dutch (2.1 ounces) growers reported higher plant yields, similar to the New Zealand growers. The higher plant yields likely reflect a range of factors including specialised cannabis horticulture knowledge, availability of high growth cannabis strains, and exceptional climatic and geographical conditions for cannabis cultivation. In general, the outdoor cultivation of cannabis tends to produce plants with higher yields (Potter *et al.*, 2015).

### *Reasons for growing*

Providing a “supply of cannabis for personal use”, “lower cost”, and to “avoid contact with the illegal drugs market” were some of the most popular reasons reported for growing among both New Zealand and Israel respondents, and indeed among the other 11 countries (Table IV). Fairly high proportions of New Zealand respondents reported growing cannabis for “(own) medical reason” (53 per cent) and “to provide others with cannabis for medical reasons” (33 per cent). In contrast, these were less common reasons provided by Israeli growers for growing cannabis (33 and 10 per cent, respectively). The combined original 11 countries were more like to grow cannabis for their own and others medical reasons (44 and 18 per cent, respectively) than the Israel sample, but still did not reach the levels reported by the New Zealand grower sample.

Only 10 per cent of the New Zealand respondents and 6 per cent of the Israeli respondents reported growing cannabis so they would sell it. Similarly, only 11 per cent of the respondents from the original 11 countries surveyed chose “so I can sell it” as a reason for growing cannabis.

### *Market participation*

Unsurprisingly, the vast majority of New Zealand (87 per cent) and Israeli (99 per cent) growers reported consuming at least part of their crops for personal cannabis use, and this resembles the

**Table IV** Reasons for growing cannabis

	<i>New Zealand</i>	<i>Israel</i>	<i>11 combined</i>
It provides me with cannabis for personal use	94	83	84
I get pleasure from growing cannabis	78	67	83
Cheaper than buying cannabis	78	79	75
To avoid contact with criminals	65	66	72
The cannabis I grow is healthier than the cannabis I buy	54	49	68
Because the plant is beautiful	64	50	48
To provide myself with cannabis for medical reasons	53	33	44
I wanted to see whether I could grow it	43	42	43
The cannabis I grow is a more consistent product than the cannabis I can buy	45	27	41
So I can share it/give it to my friends and acquaintances	51	18	40
For activist reasons (e.g. ecological ideology, fair trade)	27	27	38
I can flush the cannabis I grow to remove chemical residue	33	25	33
Because the plant is easy to take care of	42	20	32
Growing your own cannabis is not as risky as buying it	43	28	30
Because it is easier to grow than to buy	43	17	29
The cannabis I can grow is stronger than the cannabis I can buy	28	25	23
To provide others with cannabis for medical reasons	33	10	18
The cannabis I can grow is milder than the cannabis I can buy	7	3	12
So I can sell it	10	6	11

**Notes:** Values cited are % of respondents choosing each reason. The question asked respondents to tick all options that applied to them

reports from the original 11 countries (97 per cent) (Table V). The relatively lower level of New Zealand growers reporting consuming at least part of their own crop may be explained by the higher proportion of New Zealand growers who reported they grew to provide cannabis for the medicinal requirements of others. These growers may be solely focussed on supplying cannabis for the medicinal needs of others and may not use cannabis themselves. In total, 69 per cent of the New Zealand and 51 per cent of the Israeli growers also reported sharing cannabis with others, and again this was consistent with the previous 11 countries (71 per cent). New Zealand growers had a slightly higher level of swapping (30 per cent), while Israel growers reported a lower level of swapping (9 per cent) compared to the other 11 countries (26 per cent).

Approximately three out of ten of both the New Zealand (31 per cent) and Israeli growers (27 per cent) reported selling cannabis. However, the majority reported doing so to cover the costs of growing (25 and 20 per cent, respectively) rather than for profit. The New Zealand respondents reported relatively higher rates of selling for profit (20 per cent) than the Israeli respondents (15 per cent). Similarly, 3 out of 10 of the respondents from the original 11 countries reported selling cannabis to others, with the majority selling to cover the cost of growing rather than for profit.

Around two-thirds of New Zealand (68 per cent) and Israeli (66 per cent) respondents had earned 10 per cent or less of their income from cannabis cultivation. A similar proportion of growers in the 11 original countries (68 per cent overall) also reported that less than 10 per cent of their total income came from cannabis cultivation.

New Zealand growers reported a relatively high incidence of selling drugs other than cannabis (13 per cent), while very few Israeli growers reported doing so (1 per cent). Only a small minority of the respondents in the original 11 countries reported selling drugs other than cannabis (i.e. 7 per cent of the sample as a whole), although this figure was notably higher among the US (18 per cent) and Canadian (28 per cent) respondents.

#### *Police contact and other illegal activity*

Both the New Zealand (16 per cent) and Israeli (17 per cent) growers had similar levels of contact with the police due to their cannabis cultivation (Table VI). Overall, 15 per cent of respondents from the 11 original countries reported they had come into contact with the police, although there was some variation between countries (Table VI). Finnish (25 per cent), Austrian (21 per cent) and Australian (20 per cent) growers were the most likely to report contact with the police as a result of their cannabis cultivation.

**Table V** Market participation

		<i>New Zealand</i>	<i>Israel</i>	<i>11 combined</i>
What did you do with the cannabis you grew in the last 12 months? (%)	Consume for personal use	87	99	97
	Swap with other growers	30	9	26
	Give away (or share)	69	51	71
	Sell (includes both to cover costs and for profit)	31	27	29
	Sell to cover costs of growing	25	20	23
	Sell for profit	20	15	13
	Keep in your possession	30	19	36
	Total <i>n</i>	202	166	4,014
What percentage of total income came from cultivation activities? (%) <sup>a</sup>	0-10	68	66	68
	11-50	25	24	21
	51-100	7	11	12
	Total <i>n</i>	28	38	1,005
Have you sold any drugs other than cannabis or cannabis products in the last 12 months? (%)	No	87	99	93
	Yes	13	1	7
	Total <i>n</i>	54	318	4,105

**Note:** <sup>a</sup>Only those respondents reporting selling 1 per cent or more of their crop (whether for profit or for covering costs) were included in this analysis

**Table VI** Police contact related to cannabis cultivation

		New Zealand	Israel	11 combined
Have you ever come into contact with the police because of your cannabis growing? (% <sup>a</sup> )	No	84	83	86
	Yes	16	17	15
	Total			
	<i>n</i>	148	316	6,297

Note: <sup>a</sup>The percentage may not total 100 due to rounding

## Discussion

There are limitations related to the research design that are important to consider when interpreting the findings. The online survey samples are not representative of broader populations of cannabis growers in any of the participating countries. There is likely to be a bias towards smaller scale cannabis growers who are less concerned about the possibility of criminal justice repercussions from being caught growing cannabis. The fact that the survey is online also suggests a bias towards demographic groups who utilise and engage with the internet. A range of recruitment strategies were employed to attempt to minimise these sampling limitations, including the use of a wide variety of recruitment avenues, and by not offering any financial incentive to complete the survey (Barratt *et al.*, 2015). Different recruitment strategies were employed in each country, which further complicates comparisons across countries. Yet, it is important to note that many of the limitations of online purposive sampling are broadly similar to “traditional” face-to-face purposive methods of studying hidden populations (Barratt and Lenton, 2015). Furthermore, representative sampling designs are prohibitively expensive when studying very small hidden populations, like cannabis cultivators (Barratt *et al.*, 2015). The official view of illegal cannabis cultivation is almost entirely based on law enforcement data, which has its own significant biases. Consequently, we feel that our findings provide a valuable alternative picture of small-scale cannabis cultivation.

The samples of New Zealand and Israeli cannabis growers largely support the overall picture of small-scale cannabis cultivation found from the previous surveys of the 11 original countries (Potter *et al.*, 2015). The respondents were largely small-scale cultivators growing cannabis for personal use and sharing with others. While approximately three out of ten of the New Zealand and Israeli growers had sold cannabis, the majority reported doing so only to cover the costs of cultivation. Two-thirds received 10 per cent or less of their income from cannabis cultivation. The median number of cannabis plants in the crops of New Zealand and Israeli growers was five and two, respectively. The majority of the New Zealand and Israeli respondents were employed, with only around 10 per cent receiving social welfare benefits. These findings support the understanding of small-scale cannabis growing as primarily a means of “social supply” of cannabis (Potter, 2010; Hough *et al.*, 2003; Hakkarainen, Frank, Perälä and Dahl, 2011; Frank *et al.*, 2011).

In New Zealand, around half of the respondents reported growing cannabis for their own or others’ medical needs, whereas a smaller proportion reported growing for medical purposes in Israel. This may reflect the limited official access to medical cannabis in New Zealand compared to the established medical cannabis programme in Israel. It also may also merely be a strategy to divert stigmatisation by claiming cannabis cultivation and use for medical reasons. Overall, providing cannabis for medicinal reasons was one of the leading reasons for growing cannabis given by respondents from all the countries (see Hakkarainen *et al.*, 2015; Hakkarainen *et al.*, 2017). More research is needed on how medical cannabis policies may influence the motivation for small-scale cannabis growing.

Finally, 16 per cent of the New Zealand and 17 per cent of Israeli growers had come into contact with the police because of their cannabis cultivation, similar to the levels reported in the original 11 countries. This confirms that the authorities in these countries are actively involved in enforcing the prohibition of cannabis cultivation, and puts growers at risk from the negative impacts of a criminal conviction, including reduced employment, travel and housing opportunities. In New Zealand, cannabis growers also face the risk of asset forfeiture, including land where cannabis plants are found and assets deemed to be purchased with the proceeds from selling cannabis (Csete *et al.*, 2016).



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