September 22, 2002

The Science Behind the Safe Access Now Medical Marijuana* Garden Guidelines

(Based on the Sonoma County Patient Guidelines)

** Cannabis Sativa*

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Court-qualified cannabis expert

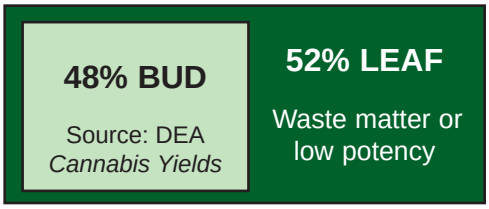
The federal government gives patients six pounds of marijuana per year, but one ounce of bud per week is adequate for most patients

Chronic Cannabis IND Patient Demographics

Patient	*Age/Gender*	*Qualifying Condition*	*IND Approval / Cannabis Usage*	*Daily Cannabis / THC Content*	*Current Status*
A	62 / F	Glaucoma	I988 / 25 years	**8 grams** / 3.80%	Disabled operator / singer / activist / vision stable
B	52 / M	Nail-Patella Syndrome	1989 / 27 years	**7 grams** / 3.75%	Disabled laborer / factotum / ambulatory
C	48 / M	Multiple Congenital Cartilaginous Exostoses	1982 / 26 years	**9 grams** / 2.75%	Full time stockbroker / disabled sailor / ambulatory
D	45 / F	Multiple Sclerosis	1991 11 years	**9 grams** / 3.5%	Disabled clothier / visual impairment / ambulatory aids

Source: Russo, Mathre, Byrne, Velin, Bach, Sanchez-Ramos and Kirlin. *Journal of Cannabis Therapeutics*, Vol. 2(1) 2002. p. 3-57. Table 1, page 9.

1) The federal **Investigational New Drug** (IND) program provides patients with 10 to 12 medical marijuana cigarettes per day — from 5.6 to 7.23 pounds per year of cannabis bud and leaf. The daily dosage documented above averages 8.24 grams per day, or **6.63 pounds per year**.
2) The **Sonoma County District Attorney guidelines** presume that a qualified patient or caregiver who possesses up to **3 pounds per year** of cannabis bud per patient, 3.73 grams per day, is a personal use quantity in compliance with Health and Safety Code 11362.5 (Proposition 215). That dosage, reduced somewhat by cleaning, comes to about 4 or 5 cigarettes a day.
3) This allows a patient to consume cannabis as needed throughout the day, to control their chronic symptoms under treatment. This baseline dosage is adequate for approximately 85% of patients.
4) Individual patients may hand roll cannabis into cigarettes, pack it into pipes, vaporize or bake with it to eat their dose in foods or capsules. Allowing three pounds of bud gives patients the flexibility to utilize the most efficacious means of consuming cannabis for their condition.
5) The Sonoma Guidelines encourage patients to use less plant matter and safer means of consumption by discarding the low grade leaf. Most patients compost leaf as waste material, or maintain a backup supply of “shake” as medicine of last resort in case the supply of bud fails.



6) Since outdoor growing allows only one crop per year, a person growing outdoors needs to harvest his / her entire three pounds of bud at once. An indoor grower may prefer to grow their annual dose, then shut down their garden for the duration except for the nursery, where mother plants are kept alive for future cuttings.
7) Based on the above, three pounds of bud per year is adequate for most patients’ needs, and reasonable but not excessive when compared to federal IND dosages. This guideline makes any cannabis investigation much more simple and clear for law enforcement officers.
8) If a patient needs more than 4 grams of cannabis bud per day, they should get an authorization from their physician and be prepared to show and explain their consumption to law enforcement.

Yield results produced by outdoor plants in a federal study

Average Cannabis Yields at Maturity for High Planting Densities

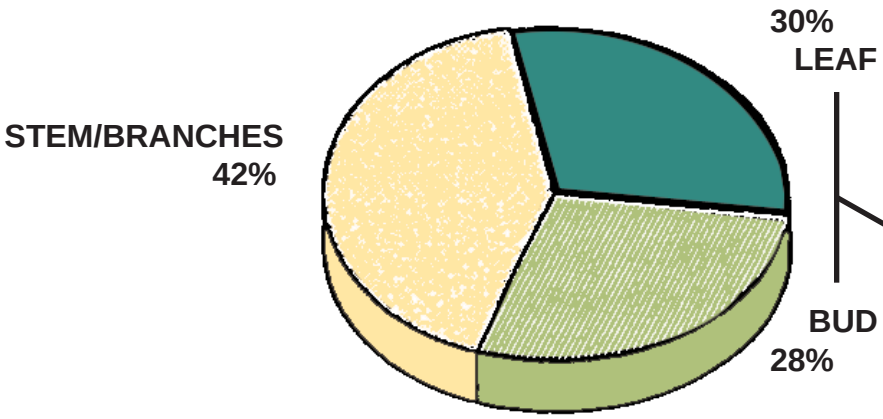
Sponsor	Year	Density	Yield*	Seed Stock
Univ of MS	1985	9 ft^2	222 grams	Mexico
Univ of MS	1986	9 ft^2	274 grams	Mexico
DEA	1990	18 ft^2	233 grams	Colombia
DEA	1991	9 ft^2	215 grams	Mexico

* Yield = Oven dry weight of usable **leaf and bud** from mature 120 day or older plants.

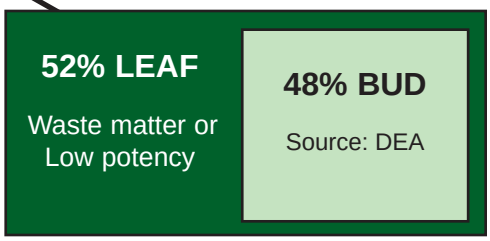
Source: *Cannabis Yields*. US Department of Justice, Drug Enforcement Administration 1992. Table 1, page 3.

SINSEMILLA CANNABIS COMPONENTS

Source: *Cannabis Yields*.
By the federal DEA, US DOJ. 1992.
Figure 2, page 5.



Proportion of yield of sinsemilla leaf to bud, excluding stems/branches



PERCENT OVEN DRY WEIGHT FOR 90 DAY OR OLDER PLANTS
WHICH DID NOT HAVE ANY SEED DEVELOPMENT

Yields of cannabis bud per square foot based on the above

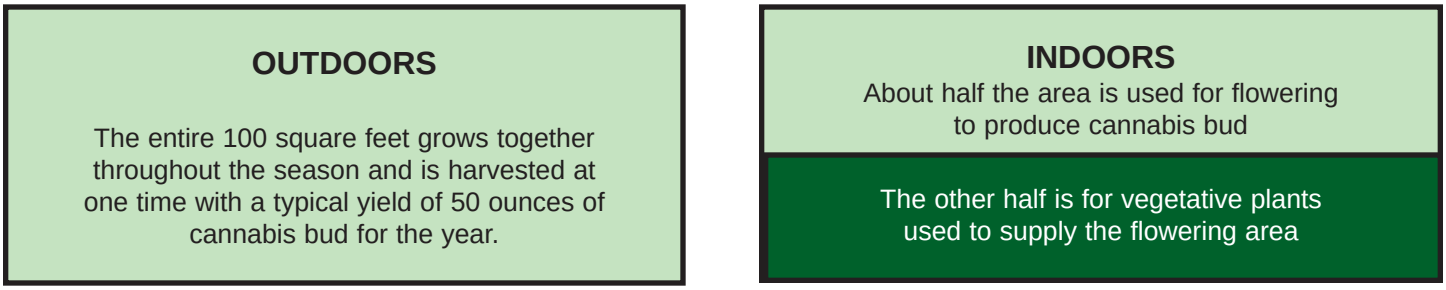
222 grams x 0.48 =	106.56 g (3.76 oz) ÷ 9 ft. =	0.41 oz/ ft^2
274 grams x 0.48 =	131.52 g (4.64 oz) ÷ 9 ft. =	0.51 oz/ ft^2
233 grams x 0.48 =	111.84 g (3.95 oz) ÷ 18 ft. =	0.21 oz/ ft^2
215 grams x 0.48 =	103.2 g (3.64 oz) ÷ 9 ft. =	0.40 oz/ ft^2

Mean average yield per plant (11.25 square foot density): 4 oz
Mean average yield per square foot: 0.38 ounces bud / $foot^2$

The 100-square-feet canopy guideline works — indoors or out

Canopy is the term used to describe all the foliage (leaf and bud) produced by growing cannabis plants. The area filled in by plant foliage is called its canopy cover. Restricting canopy area limits the yield to a reasonable level, regardless of the number of plants or which gardening method is used.

Outdoors: There is the potential for only one harvest per year. While the data above show an average yield of only 0.38 ounces per square foot, experienced outdoor growers can often achieve a half ounce per square foot. For 100 square feet of canopy to yield 3 pounds of bud per year requires a yield of 0.48 ounces per square feet. Since outdoor harvests tend to be bigger than those indoors, this is a fairly realistic final yield. The canopy need not be continuous, as in a back yard garden with several plants scattered throughout a wide area. By measuring the canopy of each cannabis plant, you can add up the total to calculate the most likely yield from any garden; for example, 11 plants each having 9 square feet of canopy would equate to 99 square feet: just within the guideline.



Indoors: While an indoor garden is typically harvested three times per year, the total yield per year will still be about the same for two reasons. First, only part of the indoor garden is used for flowering and the rest as a nursery and vegetative area that never produce any bud. Only about half of the total garden will yield usable medical marijuana, about 150 square feet harvested over the course of a year. Second, the typical indoor harvest is from 0.25 to 0.5 ounces per square foot, with a mean average of 0.38 ounces. So 150 square feet at an average harvest yields 56.25 ounces, just over an ounce per week. This allows for a loss of up to 15% of the crop to adversity — insect pests, mold or other problems — or to “down time” for maintenance. Once the patient has a supply, they can simply shut down the flowering area and keep the nursery going for future usage. The entire garden can fit into one or two average size rooms (there needs to be a barrier between the vegetative and the flowering areas because the plants are light sensitive).

Why 99 plants? Since a half-dozen large plants can produce more cannabis than hundreds of small plants, the actual number of plants in a garden does not significantly affect the overall yield if the canopy is contained. Officers can gauge a garden size without bothering to count plants or determine if the plants are rooted or cuttings, etc. The limit to 99 plants is to keep the garden size below the federal sentencing and enforcement level of 100 plants to keep it under state jurisdiction.

What if the garden is too large? Since half the cannabis plants grown from seed tend to be males that are worthless for producing medical marijuana, outdoor plant canopy should not be evaluated until the flowering cycle begins, usually by late July. After that most of the males should be eliminated, giving a better sense of the actual crop. Most patients have difficulty in gauging their likely yield, so they should be considered to be attempting to be in compliance unless there is clear evidence of sales or illegal diversion. Any bud product in excess of three pounds and any garden canopy in excess of 100 square feet could be impounded or investigated, as circumstances warrant.

Measuring the Patient Garden's Canopy

1) If a garden is rectangular and completely filled-in (no gaps or open areas), measure the length and the width and multiply to get square footage. Examples: 4x8 = 32 ft². 4x25 = 100 ft². 8x12.5 = 100 ft².

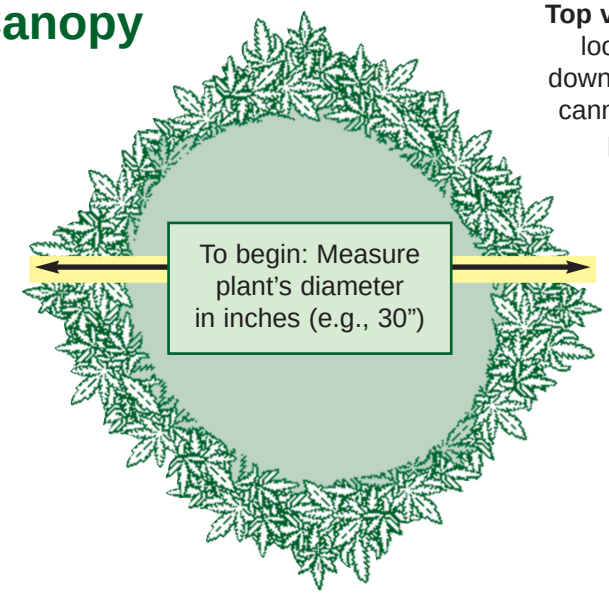
2) If a garden is rectangular and mostly filled in, but with pathways or gaps, calculate the area and subtract any open areas to find net square footage. Example: 12x12 = 144 ft², minus 44 ft² open space = 100 ft².

3) If a garden is irregular in shape or plants are scattered throughout a larger area, measure individual plant diameters or patches of plants, and add up the sum to find total canopy.

4) Repeat calculation for each plant or patch; add total for garden.

EXAMPLE:

A single plant with a canopy 30" in diameter covers almost 5 square feet



Top view, looking down at a cannabis plant

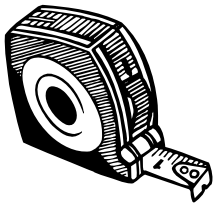
Example: Plant diameter = 30"
Area = ∏ (pi) x radius squared
Find radius: 30 ÷ 2 = 15"
Area = ∏ x (15 x 15)
A = 3.14 x 225 = 706.5 sq. inches
706.5 sq in ÷ 144* = 4.9 sq. feet
Result: plant canopy = **4.9 sq. ft.**

Short cut: Plant diameter = 30"
Area = diameter squared x 0.7854
Diameter sq. = 30 x 30 = 900
900 x 0.7854 = 706.86 sq. inches
706.86 ÷ 144* = **4.9 sq. ft**.

** 144 = square inches per square foot*

Canopy Conversion Chart, Listed by Plant Diameter

This pre-calculated conversion chart saves time in measuring single plants or rounded patches. Simply measure the diameter of the plant canopy to find the square footage below. Add up the sum of the square footage for all the plants (or patches) to find the total canopy.

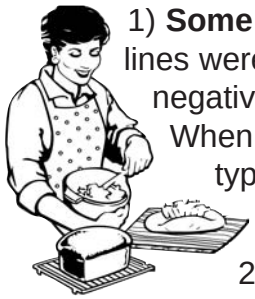


Diameter	*Sq ft*	*Diameter*	*Sq ft*	*Diameter*	*Sq ft*	*Diameter*	*Sq ft*
4"	0.09	14"	1.06	32"	5.58	**60" (5')**	**19.62**
5"	0.14	15"	1.22	34"	6.30	62"	20.95
6"	0.20	16"	1.40	**36" (3')**	**7.06**	64"	22.32
7"	0.27	17"	1.57	38"	7.87	66"	23.74
8"	0.35	18"	1.76	40"	8.72	68"	25.20
9"	0.44	19"	1.96	42"	9.61	70"	26.71
10"	0.54	20"	2.18	44"	10.55	**72" (6')**	**28.26**
11"	0.66	21"	2.40	46"	11.53	74"	29.85
12" (1 ft)	**0.79**	22"	2.63	**48" (4')**	**12.56**	76"	31.48
13"	0.92	23"	2.88	50"	13.62	78"	33.16
		24" (2')	**3.14**	52"	14.74	80"	34.88
		26"	3.68	54"	15.89	82"	36.65
		28"	4.27	56"	17.09	**84" (7')**	**38.46**
		30"	4.90	58"	18.33	86"	40.31

Diameter	*Sq ft*
88"	42.21
90"	44.15
92"	46.14
94"	48.16
96" (8')	**50.24**
98"	52.35
100"	54.51
103"	60.00
108" (9')	63.62
113"	70.00
120" (10')	78.54
125"	85.00
132" (11')	95.03
135.43"	**100.00**

Explanation: On May 4, 2001, County of Sonoma law enforcement adopted scientifically sound guidelines to accommodate bona fide medical marijuana gardens. It presumes that any qualified patient or caregiver found in possession of up to 100 square feet of garden canopy per patient is in compliance with Health and Safety Code 11362.5 (Proposition 215), when there are not more than 99 plants and 3 pounds of dried bud total. This chart is a convenient reference tool to help both patients and law enforcement apply these guidelines more easily and avoid potential misunderstandings.

Why the SAN garden guideline is not adequate for all patients



1) **Some patients need more** than three pounds of cannabis bud per year. These guidelines were designed for patients who smoke cannabis, but some people want to avoid the negative effects of smoke. Chronic patients can smoke 6, 9, 12 pounds or more per year. When cannabis is eaten, it requires about four times as much, and when "vaporized" it typically takes twice as much. Some patients need to store more than a year's supply at a time for security purposes or as a buffer against future crop failures.

2) **Some gardens produce less** than average yields, for a number of reasons.

It's not easy to grow quality medicine.

Deer, rodents and snails snack on young plants and can destroy an entire harvest. White fly, spider mites, mealy bugs, thrips, aphids and scores of other insect pests feed on cannabis. A variety of molds and mildew may attack a crop at any time, but are most common just before the harvest. Female plants may suddenly become hermaphrodite. When a seedless (sinsemilla) cannabis crop goes to seed, the total yield of bud produced is reduced by more than a third (Table 1) and the quality is lower. A power failure could wipe out an indoor crop. Thieves and police both take people's gardens. In the government sponsored university study shown at right, some big plants yielded 0.16 ounce of bud per square foot (Table 2), and if you account for seeds that is just a tenth of an ounce per square foot: 1/5 as much bud as we projected, requiring 500 square feet to yield 3 pounds of bud.

Doctor's exemption, officers discretion

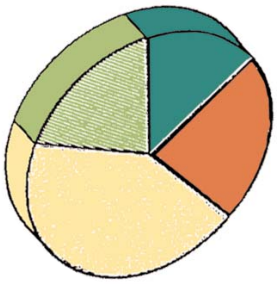
For all the above reasons, we foresee the need for physicians to allow their patients to exceed these guidelines. An officer who comes upon an apparently oversized garden would show good discretion to respect the patient and preserve their medicine.

SAFE ACCESS NOW

http:www.safeaccessnow.net

Table 1: Seeded cannabis yields 1/3 less usable bud

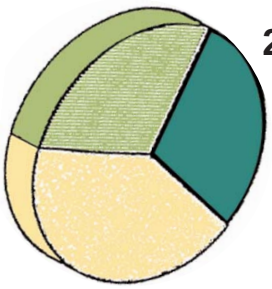
SEEDED CANNABIS



18% BUD
16% LEAF
23% SEED
43% STEM/BRANCHES

DRY WEIGHT FOR 120 DAY OR OLDER PLANTS WITH SEEDS

SINSEMILLA



28% BUD
30% LEAF
42% STEM/BRANCHES

DRY WEIGHT FOR 90 DAY OR OLDER PLANTS WITH NO SEEDS

Source: *Cannabis Yields*. US Dept. of Justice, Drug Enforcement Admin. 1992. p. 5

Table 2: Big plants can have reduced canopy yields

Source: *Cannabis Yields*. US Dept. of Justice, Drug Enforcement Admin. 1992. p. 3

Average Cannabis Yields at Maturity for Low Planting Densities

Sponsor	Year	Density	Gross Yield*	Seed Stock
DEA-A	1990	81 ft.sq.	777 grams (1.7 pounds)	Mexico
DEA-B	1990	81 ft.sq.	936 grams (2.1 pounds)	Mexico
DEA-C	1990	81 ft.sq.	640 grams (1.4 pounds)	Mexico
DEA	1991	72 ft.sq.	1015 grams (2.2 pounds)	Mexico
DEA	1991	36 ft.sq.	860 grams (1.9 pounds)	Mexico

* Yield = Dry usable **leaf and bud** from mature 120 day or older plants.

1.7# x 0.48 = 0.82# sinsemilla bud; x 0.32 = 0.54# bud (after removing seeds)
2.1# x 0.48 = 1.01#; x 0.32 = 0.67#; 1.4# x 0.48 = 0.67#; x 0.32 = 0.45# bud
2.2# x 0.48 = 1.06#; x 0.32 = 0.70#; 1.9# x 0.48 = 0.91#; x 0.32 = 0.61# bud

Yields of cannabis bud per square foot based on the above data

777g ÷ 81 sq' = 9.6g/sq'	x 0.48 = 4.6g (0.16oz);	x 0.32 = 3.1g (0.11oz)
936g ÷ 81 sq' = 11.6g/sq'	x 0.48 = 5.5g (0.19oz);	x 0.32 = 3.7g (0.13oz)
640g ÷ 81 sq' = 7.9g/sq'	x 0.48 = 3.8g (0.13oz);	x 0.32 = 2.5g (0.09oz)
1015g ÷ 72 sq' = 14.1g/sq'	x 0.48 = 6.8g (0.24oz);	x 0.32 = 4.5g (0.16oz)
860g ÷ 36 sq' = 23.9g/sq'	x 0.48 = 11.5g (0.40oz);	x 0.32 = 7.6g (0.27oz)

This chart prepared by cannabis expert Chris Conrad based on published federal data