Imagine you go into a bar and find that no matter what the alcohol content of the drinks sold, they are all sold in a single standard size, 16 oz. Order a beer, you get 16 oz. of beer. Order some wine, you get 16 oz. of wine. Order a whisky (neat of course) and you get 16 oz. of whisky.

Something similar is happening with cannabis flower. It is all sold in standardized weights no matter what the potency of the flower.

With the creation of increasingly more potent flower combined with the many emerging possibilities for inexperienced cannabis consumers to expect precise experiences from consuming the plant, there is a strong need for a standardized cannabis flower dosing system that specifically targets the amount of THC made bioavailable to the consumer.

The alcohol industry has already done this. Instead of a standardized size, drinks are sold in approximately the same amounts of consumed ethanol. This allows consumers to better anticipate the amount of intoxication that they intend to achieve.

Rationale

Standardized dosing amounts exist for edibles and are tested countless times a day by consumers. The following chart shows standard dose sizes and the maximum amount of THC allowed per package for eleven states.

State	Edible Serving (mg)	Max THC/pkg. (mg)
WA	10	100
OR	5	50
CA	10	100
AZ	10	100
CO	10	100
NV	10	100
ME	10	100
AK	5	50
MA	5.5	110
VT	5	50
MI	10	10

The average edible serving dose is 8.2 mg. Since the average consumer has experience ingesting drugs in precise doses in many forms, this is a familiar and easy to understand process. Buy a pack of ten chocolates, each with 10 mg. of THC, consume one and get one dose of edible THC.

Synthetic THC, marketed under the name Dronabinol and theoretically identical to the THC found in cannabis and consumed in edibles, has been legal in the US since 1985 for use in

treating weight loss associated with AIDS and the dietary side effects of chemotherapy for cancer patients. Dronabinol is distributed in capsule form for oral consumption in 2.5 mg, 5 mg and 10 mg doses with a maximum recommended dose of 20 mg per day.

Getting THC into a bioavailable form in precise doses when cannabis flower is smoked is much more complex. Cannabis flower is engaged in an ongoing series of changes from its last weeks on the plant and, if stored at room temperature, through months after harvest. There are natural changes happening with the flower as it ages and there are rapid changes that occur when it is heated and combusted through smoking. All of these are important when considering an intentional and mindful high.

THCA to THC conversion in curing

When green cannabis flower is harvested, nearly all the THC is in the form of THCA. Many producers harvest the flower green to speed up the overall growing process and get the flower to market quickly. Craft cannabis growers may let the flower die on the stalk. Although this takes longer, it results in vibrant fall colors and some growers claim that the last efforts of the flower to connect with pollen and produce seeds as the flower dies creates a burst of cannabinoid production that produces a more intense and complex high.

THCA to THC conversion through decarboxylation

Decarboxylation is the application of heat to convert the acidic cannabis flower cannabinoids into their neutral form. If one was to eat raw cannabis flower, it would have little effect. Heat the same flower to 320 degrees F and it suddenly becomes psychoactive to humans.[1] When THCA undergoes decarboxylation, it converts to THC at a rate of 87.7%. Thus Total THC or THCmax is calculated as (THCA * 87.7%) + THC = THCmax.

After harvesting and as the flower dries and cures, THCA is naturally and slowly converted to THC. That process continues over time, and at room temperature the conversion is nearly complete by eight weeks.[2]

At room temperature, THCmax decreases over time as flower ages and THC oxidizes at a rate of 2-4% per month.

THC to CBN conversion in aging

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[1] Wang, et al.; Cannabis and Cannabinoid Research 2016, 1.1
http://online.liebertpub.com/doi/10.1089/can.2016.0020

[2] Thermal stability of cannabinoids in dried cannabis: a kinetic study

As THCmax declines over time it generally understood that it is converted into CBN. CBN has a relaxing and sedating influence on the high, giving a potential new dimension and product category to aged flower.

Older flower does contain less THC as it ages and has historically been criticized for being less psychoactive. However, a consumer who had accurate THC potency data for aged flower could use our dosing calculator to standardize the THC dose and compare the effects on increased CBN in the flower against the strain in its fresh form.

Method of Smoking

For consumers with zero to low THC tolerance levels we recommend smoking with a glass pipe or a bubbler. For consistency, choose a device and stay with it. Different devices will have different efficiencies and switching say, between a pipe and a bong can create different levels of intoxication.

Combustion

Smoking involves using an open flame to light and combust cannabis while drawing the smoke into one's lungs. Cannabis burns at around 450 degrees F. The combustion first decarboxylates the cannabinoids to make them available to humans and then destroys about 50% of them in the process of combustion.

Bioavailable THC

In a study that sought to account for all the components of smoked cannabis, on average 37% of Total THC or THCmax was recovered and theoretically bioavailable to the smoker. An almost identical ratio of CBDmax was recovered as well. This amount did vary by strain from a low of 25% and a high of 47%.[3]

Other studies have shown lower bioavailability amounts of THC when accounting for that lost in side stream smoke. This varies both by amount smoked and by method. Using a glass pipe with three or fewer doses results in very little side stream smoke while leisurely smoking a five-dose joint would result in a lot more THC lost to side stream smoke.

Dosing Model

Our dosing guide seeks to give a theoretically average consumer about the same amount of high from one dose of flower as they would with 8 mg of ingested THC. That is a weighted average single dose for edibles. To do that we target a bioavailable dose of 1 mg of THC.

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[3] Elzinga S, Ortiz O, Raber JC (2015) The Conversion and Transfer of Cannabinoids from Cannabis to Smoke Stream in Cigarettes. Nat Prod Chem Res 3: 163. doi:10.4172/2329-6836.1000163

The dose is calculated as follows:

Target Bioavailability (.001 gr) / Bioavailability ratio (avg) for smoked flower (0.37) / Percent Total THC or THCmax for flower to be smoked = One dose of flower in grams

A recent purchase of OG Chem from Frost Factory in Washington State shows the following on the label:

THC: 0.33%
THCA: 27.48%
Total THC: 24.43%

For our dosing guide, the Total THC (THCmax) of 24.43% would be used to calculate the dose of flower.

The chart below calculates doses by Total THC/THCmax and up to three doses at a time.

Percent Total THC in Flower	3%	5%	7%	9%	11%	13%	15%	17%	19%	21%	23%	25%	27%	29%
Smoked flower one dose (grams)	0.111	0.067	0.048	0.037	0.030	0.026	0.022	0.020	0.018	0.016	0.014	0.013	0.012	0.011
Smoked flower two doses (grams)	0.222	0.133	0.095	0.074	0.061	0.051	0.044	0.039	0.035	0.032	0.029	0.027	0.025	0.023
Smoked flower three doses (grams)	0.333	0.200	0.143	0.111	0.091	0.077	0.067	0.059	0.053	0.048	0.043	0.040	0.037	0.034

To use this, one needs a precise scale that can weigh down to [text TK}. We recommend a jeweler's scale such as this one. [example here]

The process is straightforward. Look up the Total THC/THCmax percentage for the flower you want to consume, determine how many doses you want to consume, look up the target weight on the chart, weigh out the flower, and enjoy.

Accurate Dosing Across the Potency Spectrum

Using a scale and our dosing chart standardizes the THC dosing regimen for flower across the range of potencies available to consumers. It is possible to accurately predict THC levels for low to high potency flowers, creating a kind of