

Cannabis *Cannabis sativa/indica (afghanica), ruderalis*

Pliny; *Natural History Book* ~ “Gelatohyllis” – leaves of laughter

Used for fiber, food & medicine by Chinese and then onto India and beyond!

Parts Used: Sinsemilla – *unpollinated female flower*

Properties

Capitate stalked trichomes around calyx, bracts & petioles.

Trichomes:

- Trap insects
- Trap air: prevents dessication & keeps the plant warmer
- Reflects UV and infrared
- Contain cannabinoids ~ UV protectant and cause leaf necrosis
- Contain terpenes ~ insecticides (*by apoptosis*), anti-fungal, anti-bacterial.
 - Secretory cells make both by same precursor.

Chemically

500+ chemicals so far.

100 Cannabinoids (*THC, CBD, CBGA, CBG, CBCA, CBC*)

120 Terpenes

20 Flavenoids

* Pharma calls it the “entourage effect” ...we call it herbalism.

- @ Use the whole plant
- @ Studies using single extracts not as effective by 4-330x.
- @ Pharma studies using:
 - Marinol ~ THC (11-OH)
 - Sativex ~ THC + CBD 1:1

THC *Tetrahydrocannabinol*

Functions in Plant:

- Necrosis in plant cells ~ prunes leaves @ senescence for increased fertility.
- Insecticide
- Anti-fungal
- Increases with more light.

Functions in us:

- Binds CB1 & CB2 & CB3 receptors.
- Hydrophobic so travels in plasma bound to lipoproteins and albumin. Stored in adipose tissue.
- ½ life of 1-3 days.

- Broken down in liver by CP450
- Boils at 314 degrees Fahrenheit
- Vaporizes at 365 degrees Fahrenheit
- More volatile than CBD
- Strains with > 23% are rare....don't be fooled.
- Analgesic
- Intoxicant
- short-term memory loss
- muscle relaxant
- anti-inflammatory (20x greater than aspirin, 2x greater than hydrocortisone)
- immunomodulator
- anti-anorectic ~ 20 % of cancer deaths due to cachexia (*energy wasting & decreased food intake*), THC helps with both.
- anti-spasmodic
- bone stimulant
- anti-convulsant
- anti-nociceptive
- sedative
- protection against cancer
 - cytotoxic
 - anti-angiogenic
 - anti-proliferative

Preparation & Dosage:

THCA -----> THC -----> H-OH-THC -----> 11-Nor-9-Carboxyl-T
Heat (decarboxylate) *(5x more powerful)* *(Excreted)*

Oral

- @ 6-20% bioavailable
- @ 2 ½ hours after ingestion peak concentration
- @ ½ life 20-30 hours

Inhalation

- @ Easier to dose

CBD Cannabidiol

Functions in plant:

- UV protectant
- Animal/insect deterrent

Functions in us:

- Anti-anxiety

- Anti-psychotic ~ as effective as pharma with no side effects
- Anti-convulsant ~ ECS regulates seizure threshold
- Modulates ECS ~ inhibits reuptake of AEA & hydrolysis by FAAH and potentiates AEA
- Anti-emetic @ brainstem where vomit reflex is and at the GI lining
- Anti-inflammatory not at COX
- Anti-bacterial
- Immune modulator
- Anti-oxidant ~ more than tocopherol and ascorbate
- Neuroprotectant ~ prevents glutamate excitotoxicity. Reverses binge ethanol-induced toxicity. Alzheimers.
- Neurogenic ~ especially in hippocampus and hypothalamus. Alzheimers.
- Neoplastic ~ cytotoxic & cytostatic especially in gliomas. Inhibits cell migration leading to tumor invasion. Decreases oxygen to the mitochondria of cancer cells, which decreases cell survival and leads to apoptosis.
- Possible help with migration in endometriosis
- Analgesic at the vanilloid receptor (capsaicin receptor), not as noxious.
- Anti-spasmodic ~ MS spasticity
- Migraine relief
- Improves sleep but not hypnotic
- Modulates THC
 - blocks 11-OH-THC
 - inhibits anxiety & tachycardia
 - by doing the above two, more pleasure
 - potentiates analgesia of THC
- less chemo meds required.
- Binds Serotonin, TRPV-1, Vanilloid, Adenosine (*so not before bed*) receptors.
- Helps with cocaine addiction by potentiating opiate analgesia and reducing withdrawal. IL-1 antagonizes morphine and underlies tolerance; THC & CBD suppress IL-1.

Preparation and Dosage:

1:1 THC:CBD most situations ~ dependent on person's experience with THC

18:1 seizures

* *Strains like ACDC & Cannatonic ~ 20% CBD. Charlotte's web ~ 8%.*

Terpenes...."the terps"

"Essential oils are the quintessential 5th element....life force or spirit."

They are also made in the trichomes from the same precursor as phytocannabinoids, Geranyl phosphate. Their production increases with light, but decreases with soil fertility..

In the Plant:

- Insecticide
- Bitters ~ antifeedents
- Antibiotic
- Antifungal
- Gives the resinous/stickiness
- 200 different ones
- make up 10% of trichomes
- the terpene makeup is the major differentiator in plant strains.

In us:

In general:

- lipophilic
- interact with cell membranes in muscles and neurons
- act as neurotransmitters
- bind G-protein receptors
- activate second messenger and enzymes
- Modulate THC
- Binds CB1 receptors
- Increase Norepinephrine (tricyclics)
- Increase Dopamine (MOA inhibitor)
- Augments GABA
- Increases Serotonin receptors (Prozac)
- Promote hepatic detox enzymes for carcinogens (Phase II)
- Stimulate apoptosis in cells with damaged DNA
- May synergistically affect pain and mood

Predominate Monoterpenes

Beta Myrcene (*Earthy, fruity, clove-like*)

- Most abundant EO in cannabis
- Also in Hops, mangos and Lemongrass
- Analgesic
- Anti-inflammatory @ PGE2
- Sedative
- Increases effects of THC at brain by increasing permeability at cell membrane.
- Anti-proliferative
- Anti-mutogenic
- Anti-psychotic
- Anti-spasmodic

Limonene (*Lemon*)

- 2nd most abundant
- anxiolytic
- immunostimulant via inhalation

- anti-cancer
 - apoptosis...especially breast
 - induces Phase II detox of liver enzymes
 - increases differentiation of cancer cells which inhibits tumor growth
 - disables proteins made by cell-growth promoting oncogenes.
- anti-bacterial
- anti-fungal
- anti-depressant
- decreases gastric hyperacidity (GERD)
- supports intestinal peristalsis

Pinene (*Pine*)

- most abundant terpene in the plant world
- anti-inflammatory @ PGE-1
- bronchodilator ~ Increases THC absorption
- anti-biotic
- Acherase inhibitor ~ helps with memory and focus
- Increases self-satisfaction and energy

** All of the above three act as insect repellants at the top of the plant.*

Linalool (*Floral*)

- Anti-anxiety
- Anti-cancer
- Anti-convulsant via glutamate
- Sedative
- Analgesic
- Local anesthetic

Sesquiterpenes ~ Bitters/anti-feedents

Caryophyllene (*Black pepper*)

- Anti-inflammatory @ PGE-1
- Neuroprotective through CB2 agonist
- Helps with addiction
- Gastric cytoprotective
- Analgesic
- Anti-bacterial
- Anti-depressant
- Anti-proliferative
- Anti-oxidant

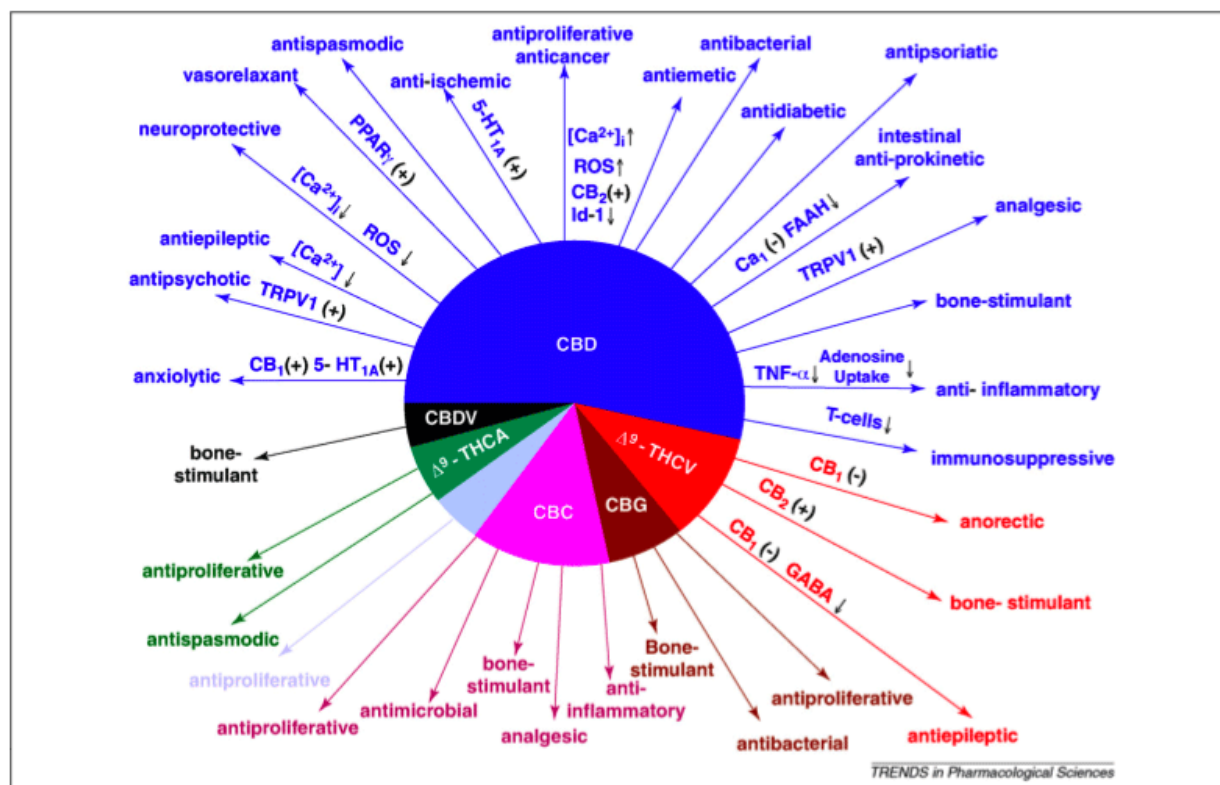


Figure 1. Pharmacological actions of non-psychotropic cannabinoids (with the indication of the proposed mechanisms of action).
 Abbreviations: Δ^9 -THC, Δ^9 -tetrahydrocannabinol; Δ^8 -THC, Δ^8 -tetrahydrocannabinol; CBN, cannabiniol; CBD, cannabidiol; Δ^9 -THCV, Δ^9 -tetrahydrocannabinol; CBC, cannabichromene; CBG, cannabigerol; Δ^9 -THCA, Δ^9 -tetrahydrocannabinolic acid; CBDA, cannabidiolic acid; TRPV1, transient receptor potential vanilloid type 1; PPAR γ , peroxisome proliferator-activated receptor γ ; ROS, reactive oxygen species; 5-HT $_{1A}$, 5-hydroxytryptamine receptor subtype 1A; FAAH, fatty acid amide hydrolase. (+), direct or indirect activation; \uparrow , increase; \downarrow , decrease.

Preparation & Dosage:

Delivery System:

- **Inhalation:** Combustion vs. vaporizing.....Minimum effective dose! No flavonoid effects.
- **Oral:** longer lasting, harder regulation/standardization. No terpene effects, yes to flavonoids.

Preparation of plant material:

- Dried or fresh plant
- Hash
- Butter
- Resin Extract

Contraindications:

- Addiction ~ 9% addiction rate. Will go up as more use of concentrated forms
- Anxiety ~ increased THC (especially unopposed by CBD) causes anxiety. Harvested too early as well.

- Insomnia ~ high THC strains and/or low Myrcene strains
- Heart Issues ~ initially raises heart rate and lowers blood pressure.
- CYP450 metabolism
- Thinking outside the box 😊
- Psychosis/Schizophrenia ~ previous history, family history, other substance abuse.

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