



ACADEMIA DE CIÊNCIAS FARMACÊUTICAS DO BRASIL  
Academia Nacional de Farmácia



# **Fórum: CANABIDIOL**

## **“Espécies de cannabis, caracterização botânica e fitoquímica”**

**Profa. Margarete Akemi Kishi<sub>R</sub>**

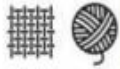


Etnofarmacologia



planta cultivada

- *C. sativa* fiber first appears in Taiwan
- Emperor Shen Neng of China first prescribes medicinal *C. sativa*
- *C. sativa* rope appears in southern Russia
- Herodotus's Histories mention hemp fabrics and use of cannabis by Scythian
- *C. sativa* rope appears in Greece.



- Chinese surgeon Hua T'o uses *C. sativa* as anesthetic
- French queen Arnegunde is buried with hemp cloth
- Vikings take hemp rope and seeds to Iceland
- Hasan-ibn-Sabah recruits assassins with hashish
- 1001 Nights, an Arabian collection of tales, describes hashish's intoxicating properties



- Irish physician O'Shaughnessy publishes *cannabis* research in English medical journal
- French author Gautier publishes The Hashish Club
- French physician Moreau publishes Hashish and Mental Illness
- Marijuana Tax Act passes, requiring special fees for prescriptions of the drugs
- *C. sativa* removed from U.S. Pharmacopoeia



8000 – 200 B.C.

200 B.C. – 200 A.D.

200 – 1500 A.D.

1500 – 1800 A.D.

1800 – 1950 A.D.

1950 A.D. – To date



- Pliny the Elder's The Natural History mentions hemp rope and marijuana analgesic effects
- Plutarch mentions Thracians using cannabis as an intoxicant
- Discorides, a physician in Nero's army, lists medical marijuana in his pharmacopoeia
- Greek physician Galen prescribes marijuana as a medicine

- Portuguese physician Garcia da Orta reports *C. sativa* effects
- China's Li Shih-Chen writes of antibiotic and antiemetic effects of *C. sativa*
- Linnaeus classifies *Cannabis sativa*
- Lamarck classifies the plant *Cannabis indica*
- Napoleon's soldiers learn of *cannabis* and hashish in Egypt



- Czech researchers confirm antibiotic and analgesic effects of *cannabis*
- Gaoni and Mechoulam isolated and synthesized the main phytocannabinoid, D9-THC
- FDA approves dronabinol, a synthetic D9-THC for cancer patients
- FDA approves dronabinol for AIDS-wasting syndrome
- Many Western countries adopt laws in support of medical *C. sativa* uses

# Distribuição geográfica





# Família Cannabaceae – Tropicos 2019

Scientific Name ▲	Author	Reference	Date
<i>Cannabis</i>	L.	Sp. Pl. 2: 1027	1753
<i>Cannabis americana</i>	Pharm. ex Wehmer	Pfl.-Stoffe 157	1911
<i>Cannabis chinensis</i>	Delile		
<i>Cannabis erratica</i>	Siev.	Neueste Nord. Beytr. Phys. Geogr. Erd- Völkerbeschreib. 7: 174	1793
<i>Cannabis faetens</i>	Gilib.		
<i>Cannabis generalis</i>	E.H.L. Krause	Deutschl. Fl. (ed. 2) ed. 2, 4: 199	1905
<i>Cannabis gigantea</i>	Crevost	Bull. Écon. Indochine n.s., 19: 613	1917
<i>Cannabis indica</i>	Lam.	Encycl. 1(2): 695	1785
<i>Cannabis indica</i> fo. <i>afghanica</i>	(Vavilov) Vavilov	Agr. Afghanist. 381	1929
<i>Cannabis indica</i> var. <i>kafiristanica</i>	Vavilov	Agr. Afghanist. 381	1929
<i>Cannabis</i> × <i>intersita</i>	Soják		
<i>Cannabis intersita</i>	Soják	Novit. Bot. Delect. Seminum Horti Bot. Univ. Carol. Prag. 1960: 20	1960
<i>Cannabis kafiristanica</i>	(Vavilov) Chrték	Cas. Nár. Mus., Odd. Prír. 150: 22	1981
<i>Cannabis lupulus</i>	Scop.		
<i>Cannabis macrosperma</i>	Stokes	Bot. Mat. Med. 4: 539	1812
<i>Cannabis ruderalis</i>	Janisch.	Trudy Glavn. Bot. Sada 43: 84	1930
<i>Cannabis sativa</i>	L.	Sp. Pl. 2: 1027	1753
<i>Cannabis sativa</i> fo. <i>afghanica</i>	Vavilov	Trudy Prikl. Bot. 16(2): 227	1926
<i>Cannabis sativa</i> fo. <i>chinensis</i>	(Delile) A. DC.	Prodr. 16(1): 31	1869
<i>Cannabis sativa</i> var. <i>gigantea</i>	Alef.	Landw. Fl. 288	1866
<i>Cannabis sativa</i> subsp. <i>indica</i>	(Lam.) E. Small & Cronquist	Taxon 25: 426	1976
<i>Cannabis sativa</i> var. <i>indica</i>	(Lam.) Wehmer	Pfl.-Stoffe 157	1911
<i>Cannabis sativa</i> var. <i>indica</i>	(Lam.) E. Small & Cronquist	Taxon 25(4): 426	1976
<i>Cannabis sativa</i> subsp. <i>intersita</i>	(Soják) Soják	Cas. Nár. Mus., Odd. Prír. 148: 77	1979 [1980]
<i>Cannabis sativa</i> var. <i>kafiristanica</i>	(Vavilov) E. Small & Cronquist	Taxon 25: 429	1976
<i>Cannabis sativa</i> var. <i>kif</i>	A. DC.	Prodr. 16(1): 30	1869
<i>Cannabis sativa</i> var. <i>macrosperma</i>	(Stokes) Asch. & Graebn.	Syn. Mitteleur. Fl. 4: 599	1911
<i>Cannabis sativa</i> var. <i>monoica</i>	Hol.	Let. Matice Slov. 1(43): 367	1873
<i>Cannabis sativa</i> fo. <i>pedemontana</i>	A. DC.	Prodr. 16(1): 31	1869
<i>Cannabis sativa</i> var. <i>praecox</i>	Serebr.	Trudy Prikl. Bot. 18(1): 410	1928
<i>Cannabis sativa</i> var. <i>ruderalis</i>	Janisch.	Uchen. Zap. Saratovsk. Gosud. Chernyshevskogo Univ. 2(2): 14	1924
<i>Cannabis sativa</i> var. <i>ruderalis</i>	(Janisch.) S.Z. Liou	in Fl. Liaoningica 1: 289	1988
<i>Cannabis sativa</i> var. <i>sativa</i>			
<i>Cannabis sativa</i> subsp. <i>spontanea</i>	Serebr.		
<i>Cannabis sativa</i> var. <i>spontanea</i>	Vavilov		
* <i>Cannabis sativa</i> fo. <i>vulgaris</i>	(Alef.) Voss	Vilm. Blumengärtn. ed. 3 1: 912	1896
* <i>Cannabis sativa</i> var. <i>vulgaris</i>	(L.) Alef.	Landw. Fl. 288	1866

# *Cannabis sativa* subespécies ou variedades

## Tropicos 2019

<i>Cannabis sativa</i>	L.
<i>Cannabis sativa</i> fo. <i>afghanica</i>	Vavilov
<i>Cannabis sativa</i> fo. <i>chinensis</i>	(Delile) A. DC.
<i>Cannabis sativa</i> var. <i>gigantea</i>	Alef.
<i>Cannabis sativa</i> subsp. <i>indica</i>	(Lam.) E. Small & Cronquist
<i>Cannabis sativa</i> var. <i>indica</i>	(Lam.) Wehmer
<i>Cannabis sativa</i> var. <i>indica</i>	(Lam.) E. Small & Cronquist
<i>Cannabis sativa</i> subsp. <i>intersita</i>	(Soják) Soják
<i>Cannabis sativa</i> var. <i>kafiristanica</i>	(Vavilov) E. Small & Cronquist
<i>Cannabis sativa</i> var. <i>kif</i>	A. DC.
<i>Cannabis sativa</i> var. <i>macrosperma</i>	(Stokes) Asch. & Graebn.
<i>Cannabis sativa</i> var. <i>monoica</i>	Hol.
<i>Cannabis sativa</i> fo. <i>pedemontana</i>	A. DC.
<i>Cannabis sativa</i> var. <i>praecox</i>	Serebr.



## SATIVA

Folíolos mais estreitos, ramos mais afastados e coloração que tende mais para o “verde primavera”. É a maior das plantas e produz menos flores. **Maior concentração de THC.**



## INDICA

Folíolos mais largos que se sobrepõem, galhos que estão mais próximos e uma coloração que tende mais para o verde oliva. A planta é mais curta e mais densa, produzindo botões de flores mais grossos e mais densos. **Maior proporção de CBD.**



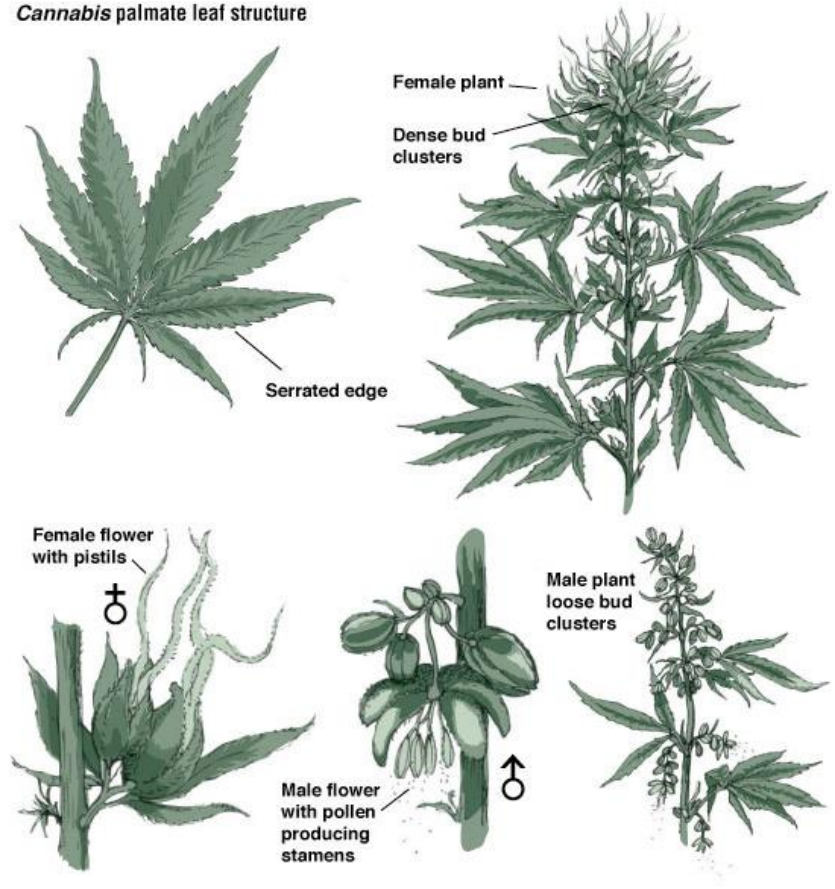
## RUDERALIS

Folíolos variados, a planta apresenta uma estatura mais baixa e tamanho geralmente pequeno. Esta subespécie é usada para **criar híbridos** *C. sativa* ou *C. indica* com características desejadas selecionadas.

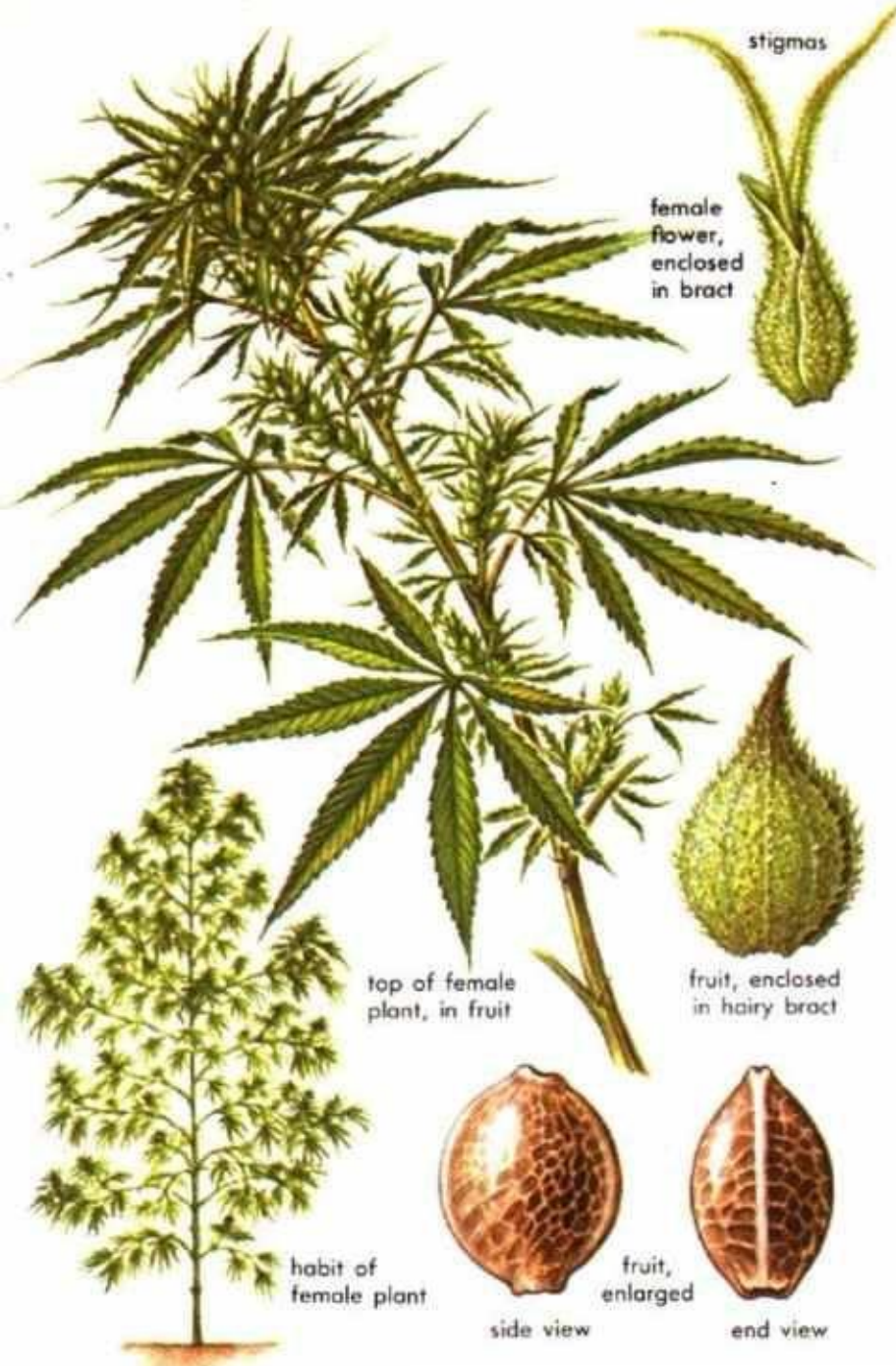
A cannabis é uma planta florida, anual e dioica, o que significa que existem plantas macho (estaminada) e fêmea (pistiladas), que cresce livremente em várias partes do mundo, principalmente nas regiões tropicais e temperadas.



*Cannabis* palmate leaf structure





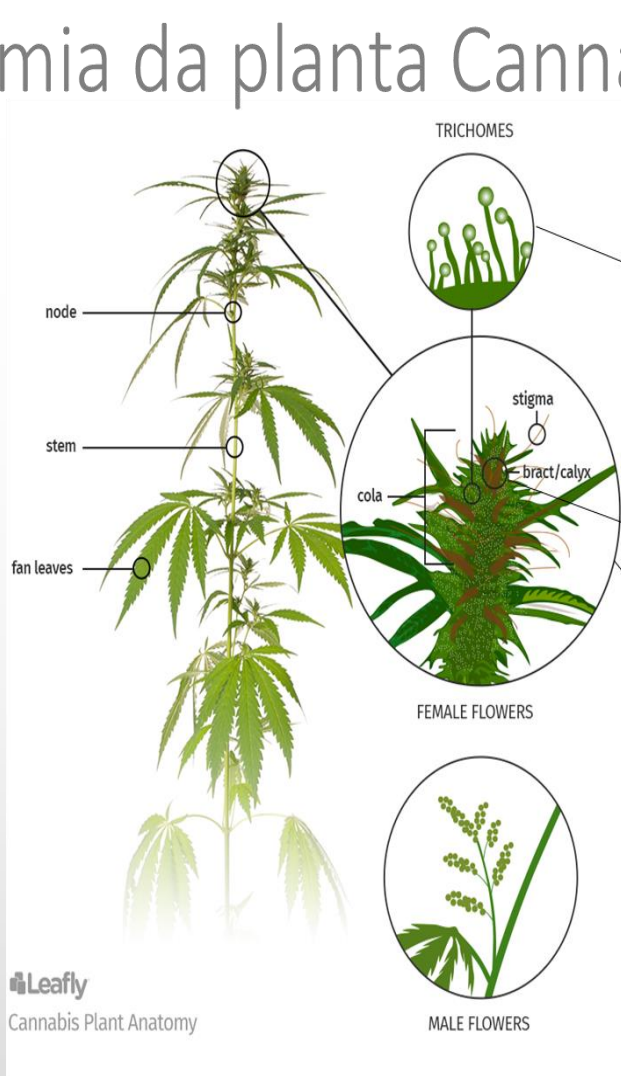


# Anatomia da planta Cannabis

Papel

Cordas

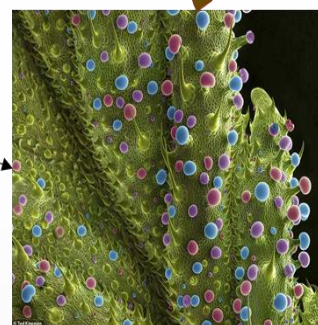
Tecidos e fios



Resina

Óleos aromáticos (terpenos)

THC e CBD

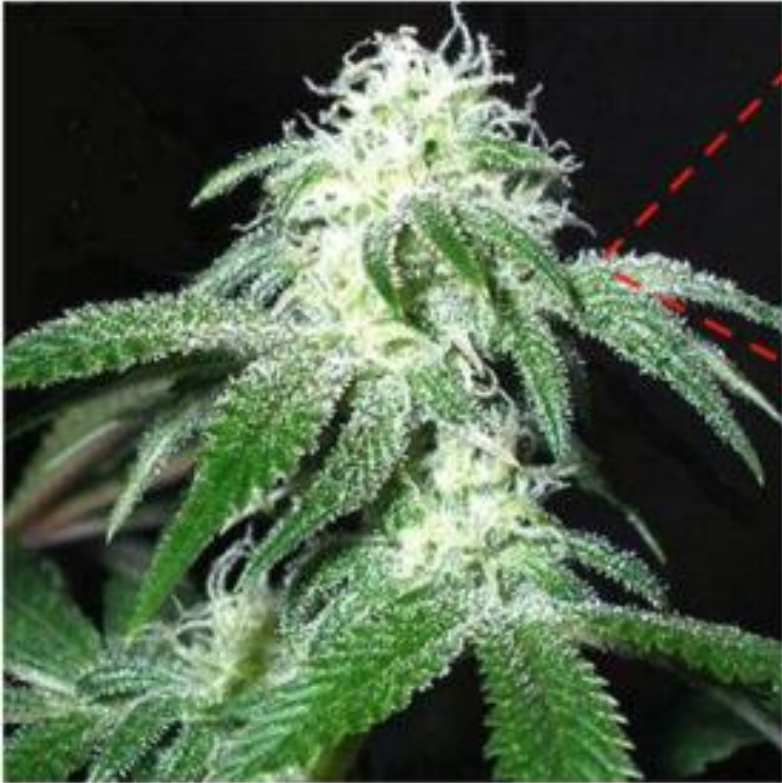


Bráctea

Encapsula as partes reprodutivas



THC e CBD



**Tabela 1: Concentração de THC em diferentes órgãos da C.sativa**

<i>Órgão</i>	<i>Percentual de THC</i>
<i>Flores femininas</i>	<i>10-12%</i>
<i>Folhas</i>	<i>1-2%</i>
<i>Talos</i>	<i>0,1-0,3 %</i>
<i>Raízes</i>	<i>&lt; 0,03 %</i>



# Quimiotipos

Induzidos pelo tipo de solo, densidade de plantio, adubação nitrogenada, genética da semente e época da colheita

De acordo com o conteúdo de THC e CBD:

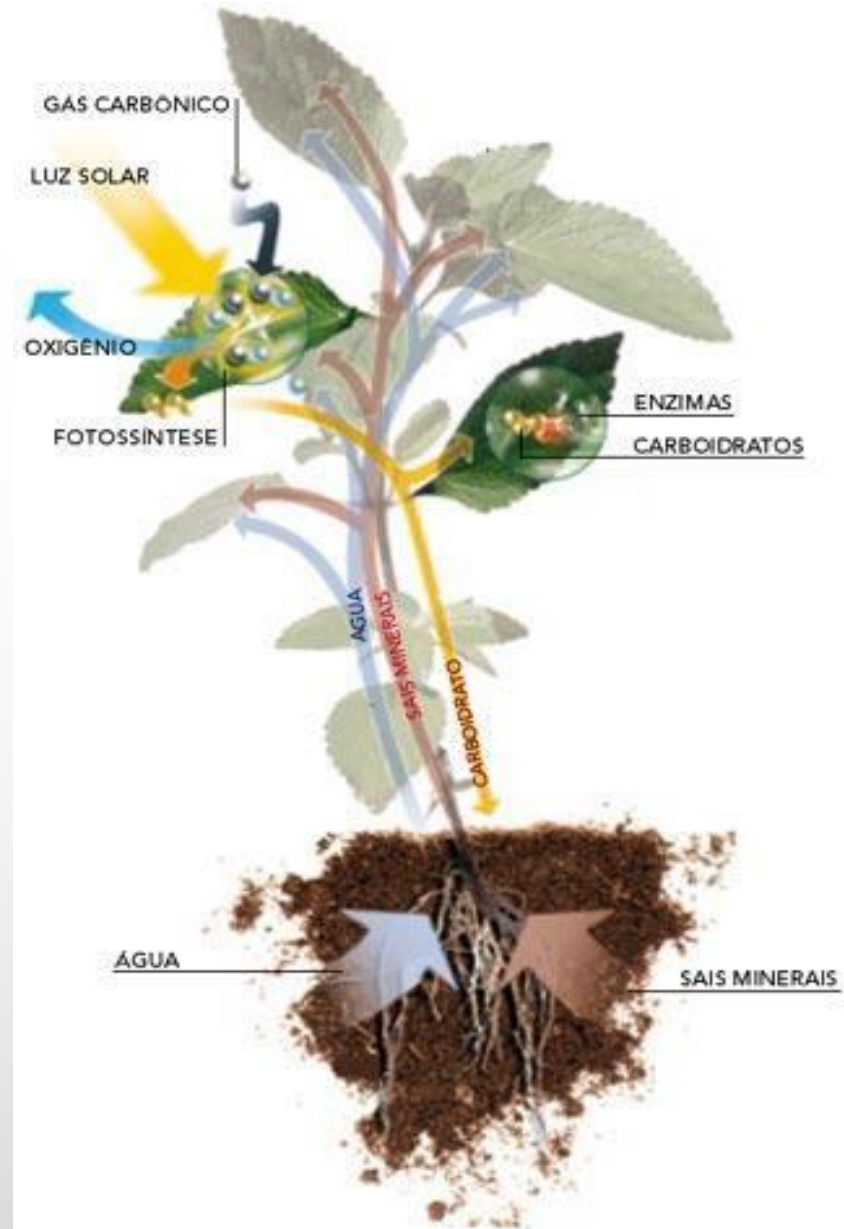
I – tipo droga (alto conteúdo de THC (>2,0%) )

II – tipo intermediário (THC (>0,5%) = CBD (>0,5%) )

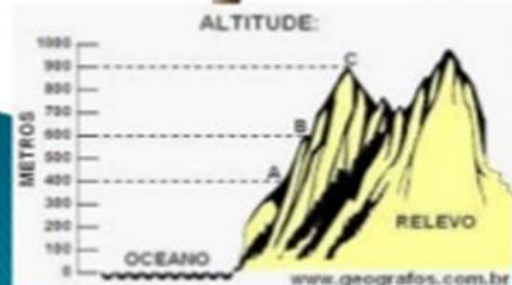
III – tipo fibra (CDB > THC (<0,3%))



# METABOLISMO DAS PLANTAS



# FATORES EXTERNOS QUE INFLUENCIAM NO CONTEÚDO DE METABÓLITOS SECUNDÁRIOS e NA QUALIDADE DA MATÉRIA-PRIMA VEGETAL

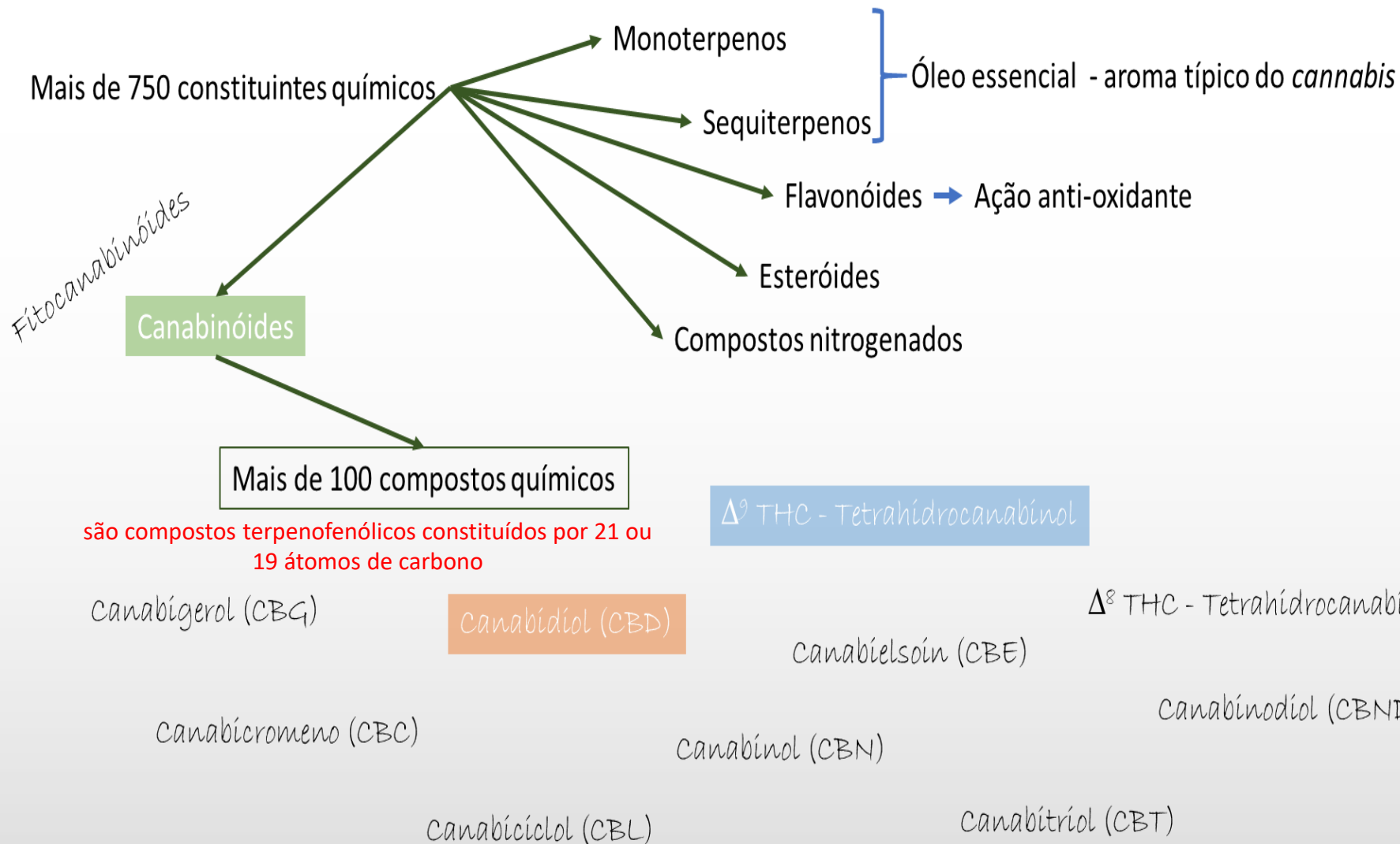


- Estímulos mecânicos
- Ataque de patógenos
- Altitude e longitude
- Luminosidade e radiação





# Metabólitos químicos da planta



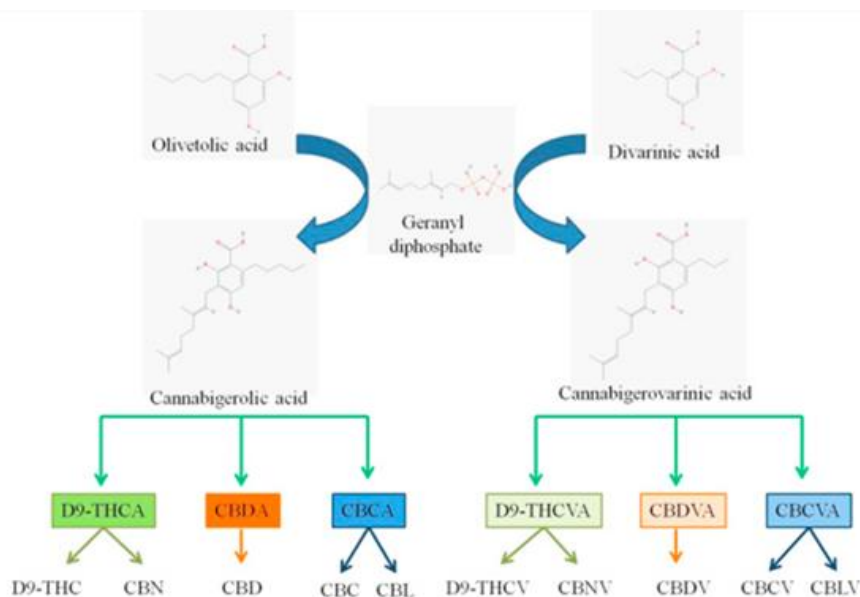
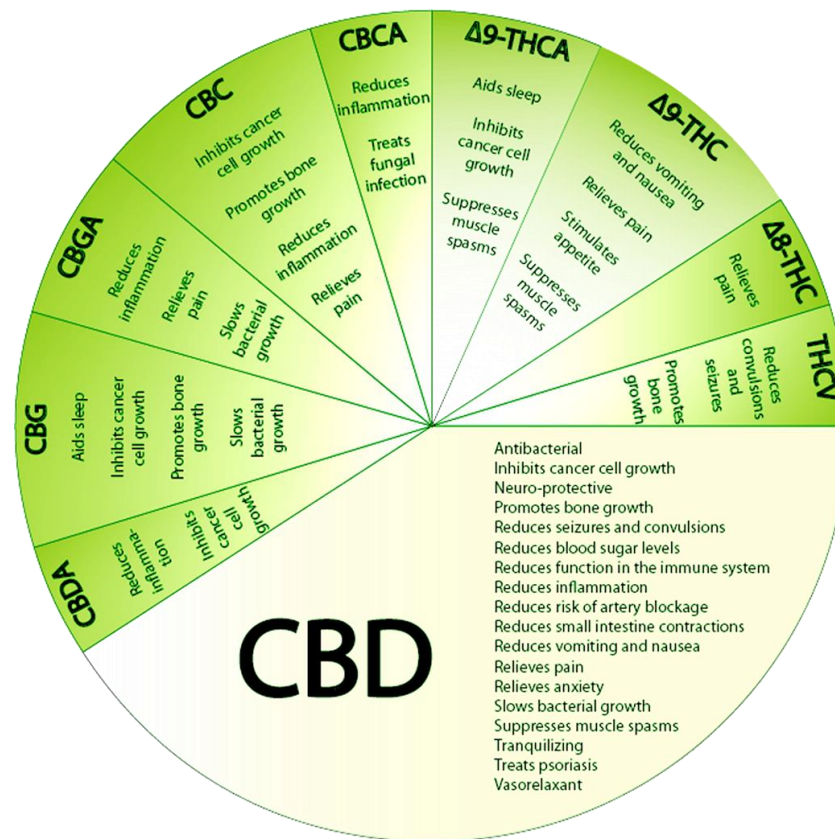
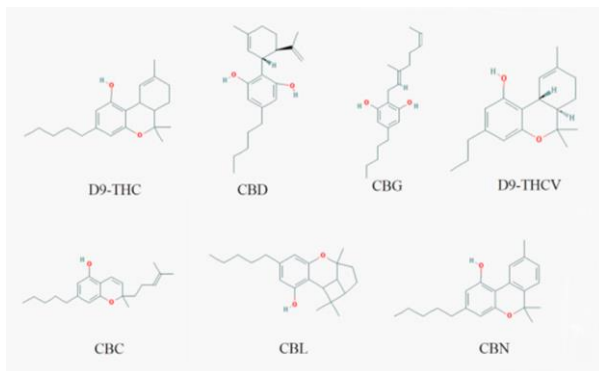
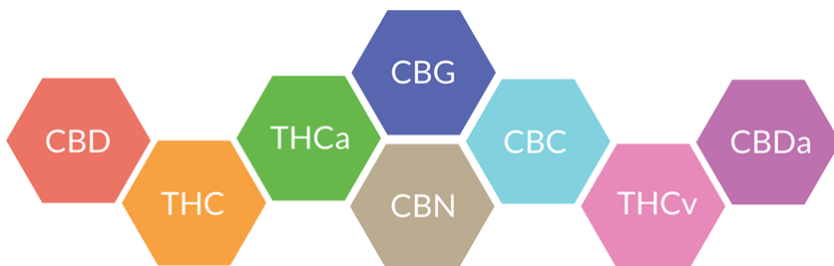
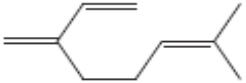
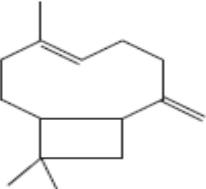
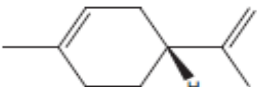
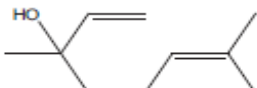
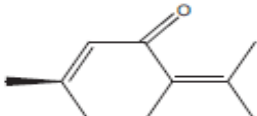

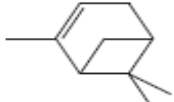
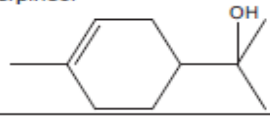
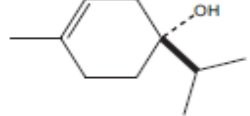
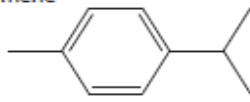
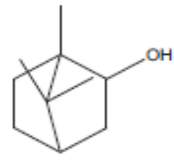



Fig. 9 . Biossíntese dos principais fitocanabinóides. O difosfato de geranil e o ácido olivetólico são convertidos por uma sintase no CBGA, os precursores centrais de D9-THCA, CBDA e CBCA, que contêm uma cadeia lateral n-pentil (fitocanabinóides C<sub>5</sub>). A partir da descarboxilação desses precursores, forma-se  $\Delta$ -9-tetra-hidrocanabinol (D9-THC) e seu metabolito canabinol (CBN), canabidiol (CBD), canabicromeno (CBC) e seu artefato químico cannabicyclol (CBL). Por outro lado, a partir do difosfato de geranil e do ácido divarinco é formado o ácido canabigerovarínico (CBGVA), uma cadeia lateral n-propil, os fitocanabinóides C<sub>3</sub>. A partir do CBGVA são sintetizados o ácido  $\Delta$ -9-tetra-hidrocanabivarina (D9-THCVA), o ácido canabidivarina (CBDVA) e o ácido cannabichromevarin (CBCVA). Sua descarboxilação forma os respectivos canabinóides D9-THCV, CBNV, CBDV, CBDV, CBCV e CBLV.

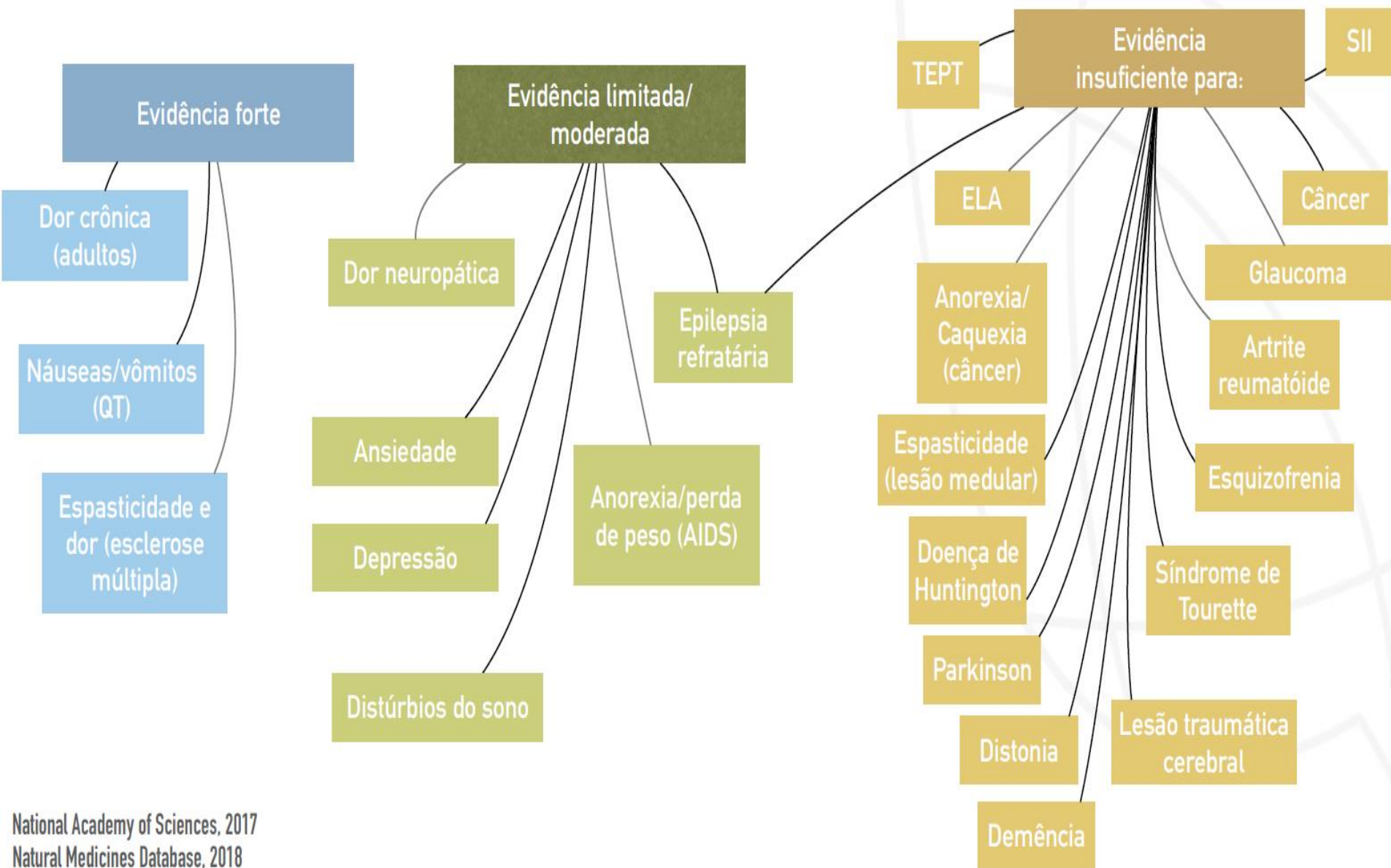


# TERPENOS

Cannabis constituent structure <sup>a</sup>	Concentration <sup>b</sup> (% dry weight)	Boiling point °C <sup>c</sup>	Properties
	0.47	166-168	Analgesic Anti-inflammatory Antibiotic Antimutagenic
	0.05	119	Anti-inflammatory Cytoprotective (gastric mucosa) Antimalarial
	0.14	177	Cannabinoid agonist? Immune potentiator Antidepressant Antimutagenic
	0.002	198	Sedative Antidepressant Anxiolytic Immune potentiator
	0.001	224	Memory booster? AChE inhibitor Sedative Antipyretic
	>0.001	176	AChE inhibitor Increases cerebral blood flow Stimulant Antibiotic Antiviral Anti-inflammatory Antinociceptive
	0.04	156	Anti-inflammatory Bronchodilator Stimulant Antibiotic Antineoplastic AChE inhibitor

Cannabis constituent structure <sup>a</sup>	Concentration <sup>b</sup> (% dry weight)	Boiling point °C <sup>c</sup>	Properties
	0.02	217-218	Sedative Antibiotic AChE inhibitor Antioxidant Antimalarial
	0.0004	209	AChE inhibitor Antibiotic
	0.0004	177	Antibiotic Anticandidal AChE inhibitor
	0.008	210	Antibiotic
	0.004	168	Anti-inflammatory





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