Presented by Scepter Lab

Testing Medical Cannabis

TABLE 1. Recommended methods for cannabis analysis

Analyte	Examples	Significance	Recommended methods
Cannabinoids	THC*, THCa, CBD, CBDa, CBN	Potency testing; important for correct dosing of medical marijuana patients	HPLC-UV GC-FID (cannot distinguish THC/ THCa or CBD/CBDa without derivatization)
Terpenes	α -pinene, limonene, β -carophylene	Confer fragrances to canna-bis and may influence medicinal properties	FET-HS-GC-FID FET-HS-GC-MS GC-FID GC-MS
Residual solvents	butane, propane, isopropanol, acetone	Solvents left over from cannabinoid extraction; may be harmful	FET-HS-GC-FID FET-HS-GC-MS
Pesticides	Organophosphates, pyrethroids, carbamates	Residual pesticides may be harmful, especially to young children or immunocompromised medical marijuana patients	HPLC-MS/MS GC-MS/MS GC-ECD (chlorinated)
Heavy metals	arsenic, mercury, lead, cadmium	Contamination from soil; high levels can be toxic	ICP-OES ICP-MS
Microbial contamination	mold, mildew, bacteria, yeast, mycotoxins, aflatoxins	May be harmful, especially to immunocompromised medical marijuana patients	Plating assays Films qPCR

*See text for abbreviations

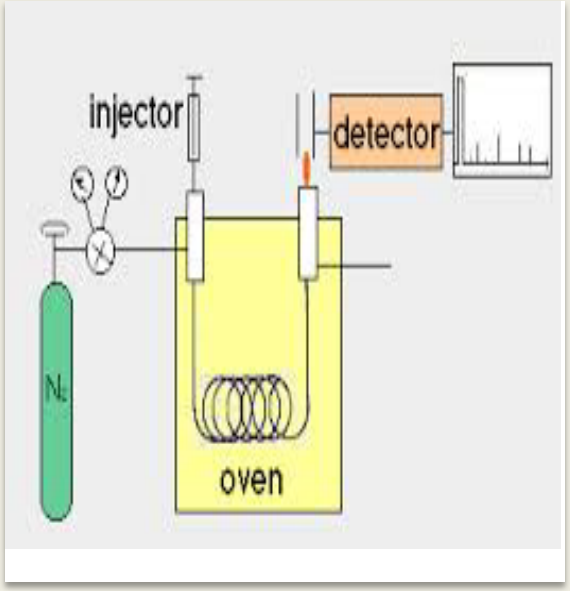
Most cannabis states require quality control testing and designate approved testing methodologies

The State of New Mexico requires licensing of all Cannabis Testing Laboratories

Requirements include:

- Director with appropriate education and experience
- Detailed Standard Operating Procedures
- Security Plan
- Quality Assurance Plan
- Instrumentation & equipment to conduct testing with accuracy
- Regular reviews and site visits
- Successful proficiency testing

Potency



Microbial Contamination

Mycotoxins

Pesticides* & Solvents

Testing for potency will provide the percentage of main cannabinoids

Most patients want to know the quantity of THC in order to regulate their dosage

Many patients are interested in the quantity of other cannabinoids so that they can purchase medication that will help with their medical condition.

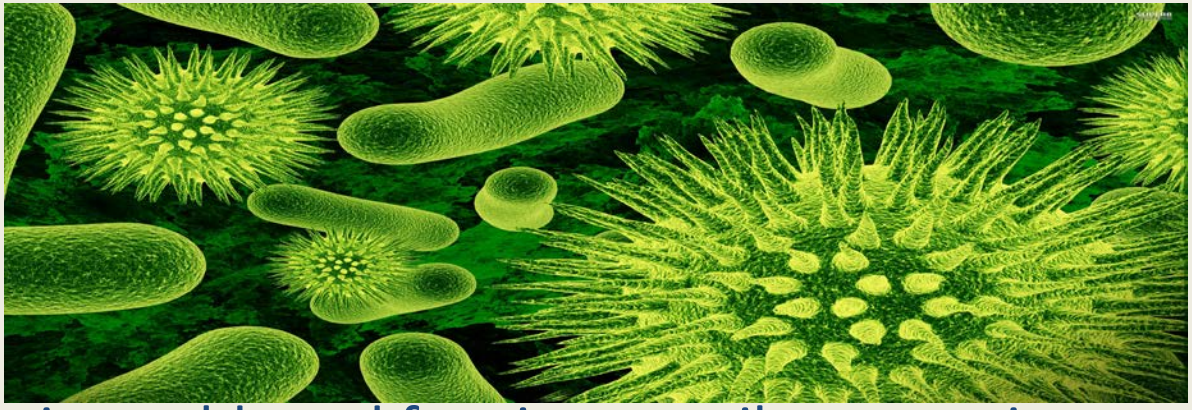
Chemical Contamination

- Cannabis is susceptible to infestation and disease just as any other crop.
- If pesticides are used during the growing cycle it is important that the levels are within acceptable limits.
- Cannabis resins may also be concentrated into highly potent medicine that will also concentrate any chemical present.

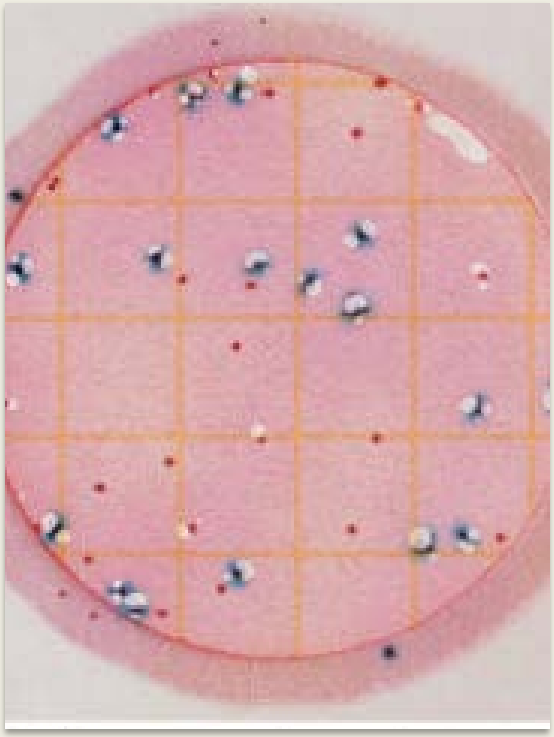
Solvent	New Mexico Action Level	Oregon Action Level	USP Pharmocopeia Action Level
Propane	800 ppm	5000 ppm	5000 ppm
Butane	800 ppm	5000 ppm	5000 ppm
Iso-butane	800 ppm	5000 ppm	5000 ppm
Pentane	800 ppm	5000 ppm	5000 ppm
Hexane	250 ppm	290 ppm	290 ppm
Cyclohexane	1000 ppm	3880 ppm	3880 ppm
Benzene	2 ppm	2 ppm	2 ppm
Toluene	800 ppm	890 ppm	890 ppm
Heptane	1000 ppm	5000 ppm	5000 ppm
Ethylbenzene	2000 ppm*	2170 ppm*	2170 ppm*
Xylenes	2000 ppm*	2170 ppm*	2170 ppm*
Methyl Alcohol	1000 ppm	3000 ppm	3000 ppm
Isopropyl Alcohol	2000 ppm	5000 ppm	5000 ppm
Methylene Chloride	500 ppm	600 ppm	600 ppm
Acetone	2000 ppm	5000 ppm	5000 ppm

New Mexico Limits for Residual Solvents compared to Oregon and the US Pharmocopeia

Microbial Contamination

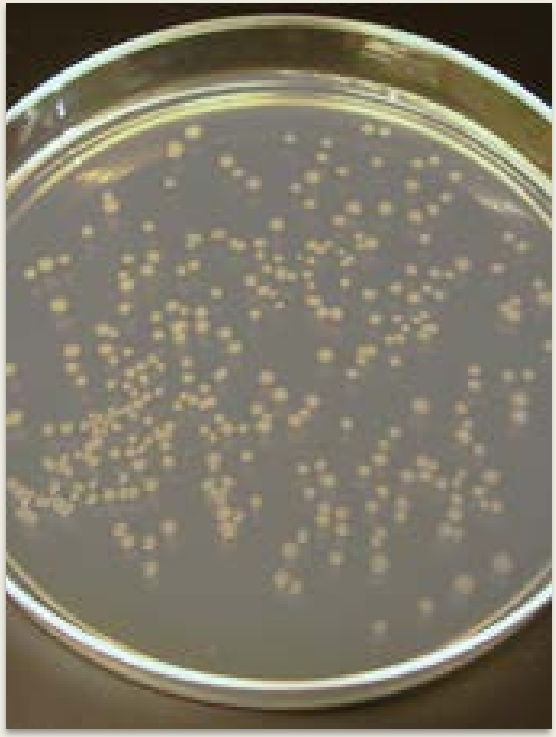


- Bacteria, molds and fungi can easily contaminate cannabis during cultivation, harvest and storage.
- Contamination can also cause patient illness.
- Testing will provide an indication of the cleanliness of the cultivation facility and will provide a measure of safety to the patient.
- The state sets standards based on the number of colony forming units per gram of material



Films

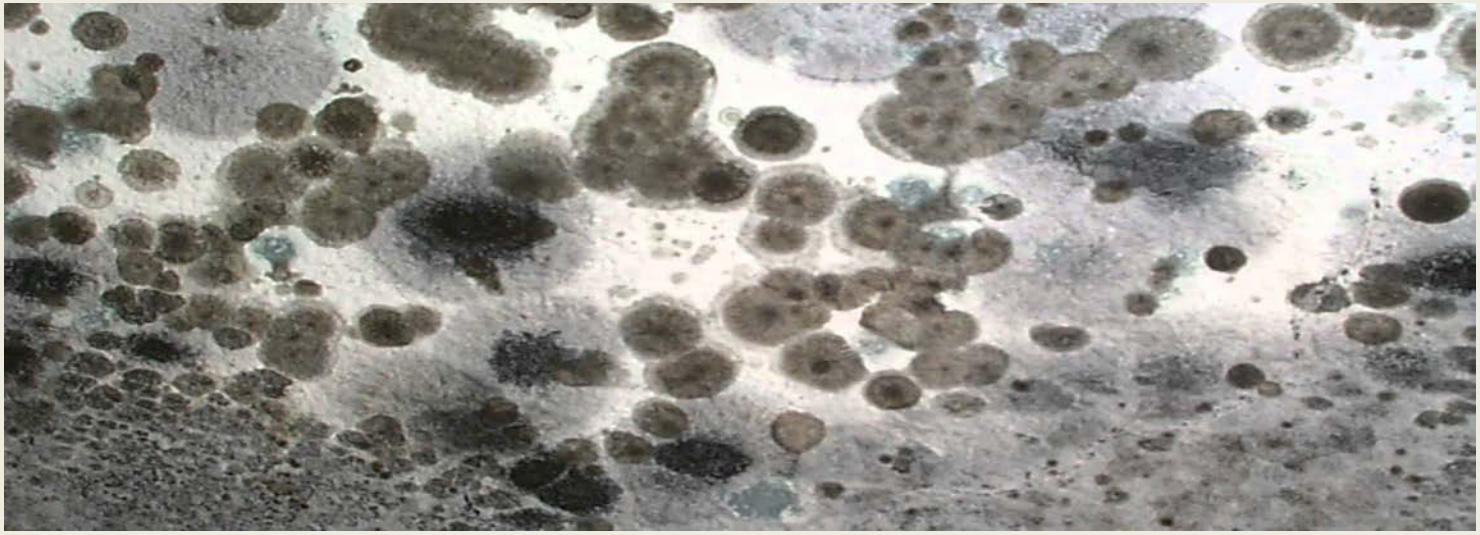
Automated Systems



Agar Plates

Test	DOH Standard
Total Aerobic	100,000
E.coli	<1
Enterobacter	1,000
Yeast & Mold	1,000
Salmonella	<1

Mycotoxins

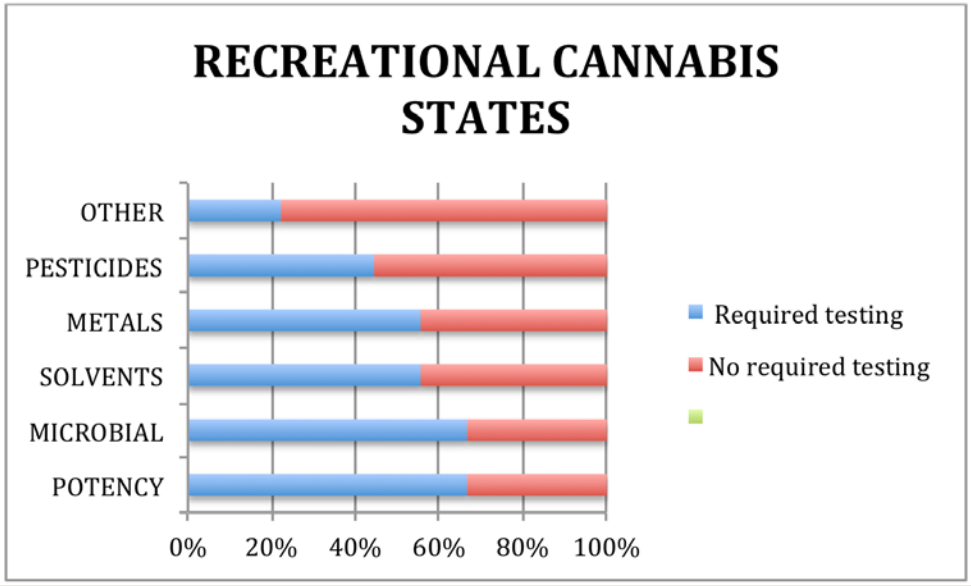


- Toxic substances produced by certain species of fungi
- Common on oil seed crops such as peanuts but also occurs occasionally on cannabis
- Develops during the post-harvest period due to improper curing or storage.
- New Mexico requires testing for Aflatoxin and Ochratoxin.

50% OF RECREATIONAL STATES DO NOT REQUIRE TESTING

RECREATIONAL Cannabis States

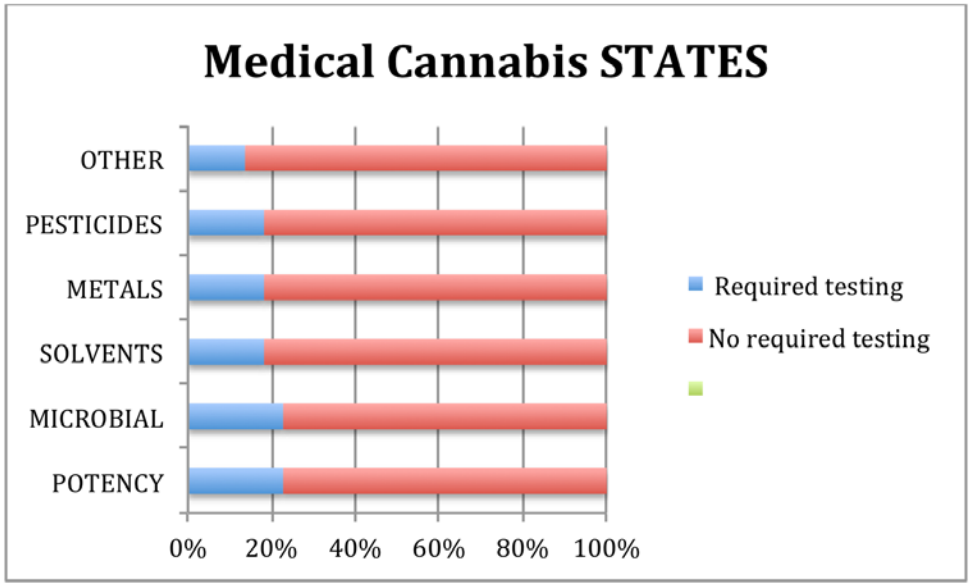
	Required testing	No required testing
POTENCY	6	3
MICROBIAL	6	3
SOLVENTS	5	4
METALS	5	4
PESTICIDES	4	5
OTHER	2	7



75% of Medical Cannabis states do not require testing.

Medical Cannabis States

	Required testing	No required testing
POTENCY	5	17
MICROBIAL	5	17
SOLVENTS	4	18
METALS	4	18
PESTICIDES	4	18
OTHER	3	19



7 states have proposed regulations pending. If all regulations are adopted, approximately 50% of medical cannabis states will require some form of testing.

Only one out of 13 “CBD only” states requires testing

CBD ONLY STATES

	Required testing	No required testing
POTENCY	1	12
MICROBIAL	1	12
SOLVENTS	1	12
METALS	0	13
PESTICIDES	1	12
OTHER	0	13