

Protocol

Cost Effective and Efficient On-site Marijuana Waste Disposal



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December 2014



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Bokashi Fermenting solves the MMJ Dispensary and Grower Waste Disposal Problem

Many states have approved medical marijuana. They are putting in place stringent regulations on how growers and dispensaries must comply with the law.

Medical marijuana waste must be properly handled.

Disposing of waste can be expensive. Dispensaries are not allowed to place waste materials in the trash containers available to the public for obvious reasons.

Regulatory agencies want to be certain that the waste materials are not left unattended or available to the public in dumpsters or containers that could be opened off site.

The growers and dispensaries are struggling to cost efficiently solve the waste disposal problem.

Waste produced at a dispensary or by a grower must be rendered unusable before it leaves the facility and then it must be transported to a properly licensed facility for composting but there are few approved available sites for composting and every step in this process is expensive and time consuming.

A chain of custody must be established for the transporting of waste from its onsite location to the approved composting site. Security must be in place. Properly approved and licensed transport services are required.

Accurate account records are required to establish that the mass of material leaving the facility is identical to the mass of material accepted at the composting site.

All of these measures add significantly to the cost and make handling the waste by either a dispensary or grower less efficient, especially if off-site waste disposal is implemented.

Waste has value. It can be recycled on-site.

Bokashi Fermenting Advantage:

- On site rapid disposal of all organic waste
- Far more efficient than composting takes only 7 days to ferment

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- Bio pulp mixed with soil results in highly enriched soil, improved microbial flora and enriched organic content soil
- Conserves water
- Requires no additional machinery or effort to process
- Eliminates odors and does not attract vermin or pests
- Fermenting is phytotoxic killing weeds and their seeds
- May combine all waste in a single operation
- Eliminates expense of pick-up and transport
- For MMJ no chain of custody additional tracking is required because waste is processed on site
- Eliminates greenhouse gas production in processing waste
- Bokashi culture mix costs are about \$25 per ton of waste processed least expensive of all waste processing methods
- Fermenting waste is the most sustainable agricultural method of waste management

Destroy MMJ Waste On-site and Eliminate Transport Problems and Expenses

There is a better way to handle the waste. Composting the waste in a bokashi fermenting system on-site solves the problem for dispensaries and growers.

This process can accommodate any size operation. Waste is degraded and rendered useless in as little as 10 days in specially designed fermenters. The bio pulp produced can be recycled in soil maintained on the premises.

A smaller dispensary may have a few pounds to several hundred pounds of waste per month. Waste is placed in the fermenter with the culture mix and allowed to be degraded to a bio pulp.

The bio pulp is then mixed with soil on the premises. The enriched soil is used to support new plants and in so doing reduces dependency on fertilizers and other nutrients that contribute to water polluting disposal problems.



Dispensary MMJ Waste Processing Cyclettes

Simplify waste disposal and eliminate the expense of off-site disposal.

A standard residential food waste fermenting system will handle 40 pounds of waste every 2 weeks. A single 55 gallon HDPE commercial fermenter handles 450 pounds every 2 weeks. A single 2 ton capacity industrial grade fermenter can handle 2 tons of waste every 2 weeks.

At the end of each cycle in processing waste the bio pulp obtained is mixed with soil to support plants eliminating the need to purchase expensive fertilizers.

Waste is no longer a problem. It is a valuable resource cycled back to soil. Biologic soils are supported simply and easily by recycling waste to the soil.



HDPE 55 gallon fermenters with band clamp and cassette seals will handle 0.5 to 12 tons of waste per month.

bokashi Ocycle Bokashi Composting is Very Easy and Fast

What is Bokashi Fermenting?



Bokashi fermenting is a method of rapidly metabolizing all organic waste with naturally occurring soil microbes. It is 10 times faster than composting, produces no greenhouse gases, produces no heat, and takes only 7 days. The "pickled" waste material is then mixed with soil to return all the nutrients and microbes to soil.

Bokashi fermenting is an approved method for disposing of MMJ waste.¹

All organic waste will rapidly decompose and noxious odors, putrefaction, and gases are eliminated. No insects or rodents are attracted to the end product. It is accomplished in a remarkably small amount of space and requires no turning, mixing, aerating, or additional materials to complete.

When processing MMJ waste, an accelerant is combined with the microbes to increase the speed of processing because the cellulose content of waste is very high. The liquid accelerant is sprayed onto the waste with each addition of culture mix and the system is then closed to exclude oxygen.

¹ http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadername1=Content-Disposition&blobheadername2=Content-Type&blobheadervalue1=inline%3B+filename%3D %22Current+Set+of+Rules%2C+Effective+July+1%2C+2011.pdf%22&blobheadervalue2=application %2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251781468397&ssbinary=true



Bokashi fermenting is very scalable. You can mix weeds, plant debris, food scraps including meat and dairy products, and any other organic material with no concerns about the carbon to nitrogen ratio.

You simply shred the material and place it in a proper fermenter. During the shredding operation you add a powder (wheat bran base inoculants) which is dispersed in the shredding step and then leave the material alone for 7 to 14 days in a sealed fermenter.

The fermenting conditions kill seeds and pathogens including E. coli and Salmonella. No methane is produced because the pH shifts to a mildly acidic profile as material is metabolized. Methanogens, the organisms that produce methane can't survive under these conditions.

For more information, on bokashi fermenting visit our WEB site at <u>www.bokashicycle.com</u> and <u>https://store.bokashicycle.com</u> or call us at 800.714.2130.

Equipment Requirements for On-Site MMJ Waste Cycling (Disposal):

Operators will be provided with a package and instructions on processing waste fitting their specific needs. We provide on-site supervision and instructions for those who need assistance in getting started. Shredding units can easily handle tons per hour.

A dedicated area for processing should be established. A shredding unit will be put into position so that all inoculated shredded material ideally falls directly into the fermenter. The fermenter is then set aside with a sealed lid equipped with a safety pressure release valve cassette. The minimum number of fermenters is two per site as one fermenter is completing the pickling process while the second is being filled. This allows the operator to continuously run and process waste without any interruptions.

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Granulating Units:



Bokashi Culture Mix:

Bokashi culture mix can be obtained in bulk. It is one of the consumables used in the recycling process and it is inexpensive. The general formula for processing is 25 pounds of culture mix per ton of waste processed.

Bokashi culture mix will cost approximately \$25 per ton of mmj waste processed. Waste recycled through soil quickly returns nutrients and microbes to feed new plants and the savings in a grow operation are substantial.



The bio pulp cycled through soil re-establishes nutrients so efficiently that little additional fertilizing will be required. Operators should experience vibrant active growth and will note less watering is required due to the increased soil organic content that avidly retains water where it is needed.

Space Requirements:

The area designated for processing is remarkably small. Fermenters have a small foot print as does the shredder. We recommend processing on a cement floor.

After the fermenters have reached the end point at 7 - 10 days, growers will then need to mix that bio-pulp with soil. This is normally done by applying it to the surface at a rate up to 10 pounds per square foot and tilling it so that it is mixed with soil and covered with a few inches of soil. The soil can then be used for planting after 14 days.

The 55 gallon HDPE fermenters measure 23 inches in diameter and stands 36 inches in height. A number of compact dollys are available making moving a full fermenter a simple task.

The 2 ton capacity fermenters measure 50 inches by 80 inches and stands 48 inches in height. They can be moved on a pallet or with attached wheels on a cement floor.

The number of fermenters required will be determined by the volume of waste being processed. For example, in processing 4 tons of waste per month, 18 fermenters (see Table 1) are needed and each occupies a space of about 4 square feet. All of the fermenters could be stored in a space less than 10 feet by 10 feet.

Industrial Scale Waste Disposal Protocol:

Growers have many options in handling MJ waste. Some growers simply prefer to render the waste in a form that can be sent off-site to a private contractor for subsequent handling. It may be sent for composting, or mixed with an approved inert material like cat litter for off-site disposal depending on local and regional regulatory requirements.

Other growers may want to recycle the material on site by either composting or fermenting the waste material saving in off-site disposal costs.

A common requirement to accomplish any of these options is the need to granulate or pulverize the material so that it can then be properly processed. Bokashicycle's MJ Granulating machine accomplishes this task efficiently and quietly in a small space. The machine was specifically designed to mince and granulate waste including root balls. All



waste should be properly reduced in size before composting or fermenting or rendering inert.

The MJ Granulater minces and granulates material delivering it directly into 55 gallon barrels or cartons placed below the machine and can handle high volume waste cycling greater than 1 ton per hour.

Bamboo Granulater Test Results:

The MJ Granulating machine has been tested and proven to consistently mince and granulate long strands of bamboo up to 1 inch in diameter and can handle larger diameter product if it is cut into shorter strands. Bamboo is far stronger than MJ waste and is a good quality control standard.

High throughput is maintained with a 1 inch grate.



Bamboo Test Material - 1 inch diameter bamboo stock material ranging in size up to 1 inch in diameter, dry and wet granulated in a single pass



Bamboo Grate Single Pass Test Results - 1 inch diameter bamboo stock rapidly minced and granulated with shredded leaves ready for compositing or fermenting

Granulating MJ Waste:

All waste can be handled easily by passing it through the granulating machine. There is no requirement for wetting or soaking this material before feeding it into the hopper however a light misting or wetting of the material will reduce the potential for dust scatter.

Bokashi Fermenting MJ Waste:

MJ waste can be fermented and returned to soil and it is an approved waste disposal process in most jurisdictions. It is a two stage process that is far faster than composting and returns to the soil the many needed nutrients that would otherwise be discarded.

Disposing of waste is a two stage process.



- 1. In the first stage the waste is destroyed by fermenting. It is inoculated and placed in an anaerobic fermenter for approximately 2 weeks at room temperature.
- 2. The end product is metabolized material that is then mixed with soil to improve the soil organic content. The metabolized waste may be repeatedly cycled by mixing with soil. New plants may be placed in this soil 10 days after the bio pulp is mixed with soil.

Inoculating the MJ Waste with Bokashi Culture Mix:

The easiest way to efficiently inoculate the waste is to add the bokashi culture mix to the waste as it passes into the granulating machine. This spreads the inoculants uniformly throughout the waste as it exits into a standard 55 gallon fermenter.

If the waste is acquired in bins that are then dumped into the hopper, a cup of bokashi culture mix in each bin at the time it is dumped will ensure uniform distribution of the culture mix in the minced and granulated waste.

If long strands and root balls are being granulated, the easier route of inoculating is to collect all of the minced and granulated waste in a 55 gallon fermenter. The operator will then add to the 55 gallon fermenter 15 gallons of water to which is added 750 mL of accelerant and 5 pounds of bokashi culture mix.

In summary, inoculating the waste is accomplished by adding 5 lbs of culture mix for each 55 gallon filled fermenter along with 15 gallons of water and 750 mL of accelerant. Minced and granulated waste must be wet and sealed in a fermenter excluding oxygen in order to properly ferment.

How Much Culture Mix and Accelerant is Required?

A 25 pound bulk pack of bokashi culture mix and a gallon of accelerant is enough material to process 1 ton of marijuana waste.

Fermenters should be packed tightly with inoculated waste and then sealed. Inoculated waste can be added incrementally until the fermenter is filled to the top. It should then be set aside for a full 10 days at which time fermenting will be complete.

What size and how many fermenters are needed?

Dispensaries and small volume waste producers do not need to shred or pulverize waste materials. They can process waste in a standard cyclette system by wetting it down, spritzing with accelerant and adding the bokashi culture mix every couple of inches as they fill the fermenter. The fermented end product is mixed with soil at the end of the process. Standard cyclettes for processing are easy to obtain by an on-line order.



Standard Cyclette Processing unit:

http://store.bokashicycle.com/Bokashi-Fermenting-System-with-Dispensing-Unit-and-12-months-supply-of-Bokashi-Culture-Mix_p_22.html

Industrial scale fermenters come in two sizes.

1. A 55 gallon HDPE open top band clamp seal fermenter equipped with a cassette and safety pressure release valve will when tightly packed hold up to 450 pounds of end product. The cassette acts as a filter so that the liquid acquired in the fermenting process can be drained and collected if the processor wants to use it diluted 1:50 with water in drip irrigating plants. The "tea" is rich in metabolic products, trace nutrients and microbes and will improve the plant performance if applied on a regular bases.

http://store.bokashicycle.com/Bokashi-Yard-Waste-Fermenting-System-55-Gallon-Capacity_p_23.html

2. 2 ton capacity large scale fermenters with an anaerobic seal. These large scale fermenters are used to advantage when the volume of waste is greater than 6 tons per month.

https://store.bokashicycle.com/ID3CuYd

3. Value pack Bokashi Culture Mix and Accelerant is available for growers who process a lot of waste and want to take advantage of discount pricing.

http://store.bokashicycle.com/Marijuana-Waste-Disposal-Value-Pack_p_50.html



Table 1: Number of Fermenters and Consumable Requirementsfor a fixed volume of marijuana waste disposal per month.

Per Month Wasto			Per Mo	nth
Volume	Fermenter Size		Required Con	sumables
(tons)	55 Gal HDPE	2 ton Cap	# BCM 25Lbs	Gals Accel
1	5		1	1
2	9		2	2
3	14		3	3
4	18		4	4
5	23		5	5
6		3	6	6
7		4	7	7
8		4	8	8
9		5	9	9
10		5	10	10
11		6	11	11
12		6	12	12
13		7	13	13
14		7	14	14
15		8	15	15

The amount of material required to process a fixed amount of waste per month is easily calculated using the figures from Table 1. For example, if the producer is generating 4 tons of waste each month, then 18 55 gallon capacity fermenters are needed to process waste. Each month 100 pounds of bokashi culture mix and 4 gallons of accelerant are needed. The operator would fill 9 fermenters in the first 2 weeks setting them aside for an additional 2 weeks while filling the other 9 fermenters.

Every 2 weeks thereafter, 9 of the fermenters are emptied. The bio pulp is mixed with soil which can be used over and over again or cycled back through the grow operation. The emptied fermenters return to be filled again and again in a continuous recycling operation.

What is needed to Ferment Marijuana Waste?

Table 2 provides a list of the needed equipment and materials for waste processing.



If the waste pH in the fermenter after adding the culture mix and accelerant with water has a pH that is greater than 6.0, the operator should adjust the pH to a level below 6.0 to be assured that fermenting will be efficient. Although this is not a common experience, it may be essential if a lot of ammonia fertilizers are used in a grow operation.

Vinegar is a simple and effective way of lowering the pH if it is required. It is inexpensive, non-toxic, and easy to use. Any kind of vinegar can be used as it is only used to lower the pH. Depending on how much ammonia or other basic materials are in the waste the operator will add vinegar to the fermenter to bring the pH into a range between 4.0 and 6.0. If the pH is above this level fermenting will be less efficient and likely will not work if it is greater than 6.5.

Table 2: List of essential materials to properly processmarijuana waste.

Materials Required for Waste Processing:			
Vinegar	Use to adjust fermenter only if the pH >6.0		
Bokashi culture mix	25 lbs will process 1 ton of waste		
Accelerant	1 gallon will process 1 ton of waste		
MJ Granulating Machine	Directs waste to fermenters, inoculates waste		
Fermenters	HDPE 55 gal band clamp/safety pressure release cassette		

Step by Step Protocol for Processing Marijuana Waste:

Activity	Comment
1. Locate the MJ Granulating machine in a flat working area along with the stair platform	Lock the wheels and attach the stair platform to the machine with the hinge gate locking unit
access	0
2. Plug the machine into a 220 volt outlet	The 3 HP Teco Westinghouse is well built and rugged. It requires single phase 220 v 50 – 60 Hz power
3. Gather MJ waste in bins or as stocks including root balls	Rocks or heavy clay materials should be removed from root balls. Remove as much soil as possible and cut to size to fit the hopper
4. Wear eye and ear protection	Operators should read the operator's manual before engaging the machine
5. Place the fermenting barrel or carton to collect minced and granulated waste below the machine stand	The stand is designed to fit 55 gallon barrels. Push the barrel so that the curtain on the stand is centered over the barrel
6. Start the machine and granulate	

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all waste filling to within 4 inches of the top of the barrel or carton	
7. Replace a filled container with an empty container	Label each granulated container by time and date
* *	

Activity	Comment
8. Bokashi Fermenting,	Arrange for off-site handling or on-site
Composting, On-site or Off-site	composting. If Bokashi fermenting
Disposal	advance to activity # 9
9. Waste collected in 55 gal size fermenters	Filled to within 4 inches of the top
10. Add 1.6 Lbs of culture mix and	
250 mL of accelerant to a 5 gallon bucket	
11. Fill the bucket with 5 gallons of water	
12. Pour the liquid slurry of culture	The objective is to wet all material and
mix, water and accelerant over	inoculate as the solution travels
the minced material in the barre	through the waste
13. Repeat Activity 10 – 12 twice so	
that 15 gallons of slurry have	
Deen put into the fermenter	Obtain a small amount of fluid from the
14. Commune pri is below 6.0	formenter and test with a pH meter or
	tane
15. Seal the fermenter using the	The safety valve fits in the top of the
band clamp lock and check that	cassette attached to the lid for the
the safety pressure valve is in	fermenter
place	
16. Record the ID for the fermener	Each barrel lid has its own ID number
in a log book and the date	or label
fermenting started	
17. Allow at least 10 to 14 days at	
room temperature	
18. After fermenting check the pH to	
De certain it is below 6.0	
19. Drain ilquids from the fermenter	'l'had lagand oon ho nachte steten et state
	This liquid can be used to water plants.
removing the safety valve	It is rich in nutrients.



including liquids can be mixed with soil	normal soil or mixing into a pile of soil will result in its rapid further incorporation into the soil
21. Allow a few weeks for the soil with fermented end product to mature	Soil with end product can be recycled or sent off site for use in gardens

You may throw any food scraps into the granulating machine hopper when the marijuana waste is being minced and granulated. The food scraps will ferment and accelerate marijuana waste processing.

What about Pathogens and other un-wanted chemical biproducts?

Bokashi fermenting is a very efficient way of killing pathogens including *E. coli*_ and *Salmonella*. The enzymatic activity in the fermenting process will break down most chemical compounds into basic simple molecules and it will kill most seeds. Do not add petroleum products or oils as they will interfere in efficient fermenting.

Wear gloves when handling the end products as they are mildly acidic (like vinegar) and wash your skin or eyes with copious amounts of water if you accidentally splash the material on the skin or eyes. We recommend wearing safety goggles in addition to gloves as a common sense precaution.

What is the starting basic system for waste processing?

Bokashicycle recommends for all growers a basic minimal system that consists of the electric 3 HP pulverizing machine on its stand with swivel wheels and 2 55 gallon yard waste fermenting systems. The yard waste fermenting systems come with enough culture mix and accelerant to process up to 2 tons of waste.

3 HP 220v 1 PH Electric Granulating Machine: https://store.bokashicycle.com/MJ-Granulating-Machine--3-HP-Electric-single-phase-220v p 54.html

Yard Waste Fermenting System: https://store.bokashicycle.com/bcomm01

Bokashicycle offers wholesale pricing and discounts to all growers for volume orders. Bokashi culture mix kept dry and protected has a shelf life greater than 5 years as does the accelerant. A volume discount pack of 500 pounds of culture mix and 20 gallons of accelerant on a single skid is offered at \$995 plus delivery. That is enough inoculants to process 20 tons of waste.



Getting Started with a Quote:

Bokashicycle will provide to the grower a recommended set up for processing all waste based on the information provided.

The quote will include the cost of equipment, number of fermenters, and amount of culture mix needed to process all waste efficiently.

Call us for a quote at 800.714.2130 or email us at support@bokashicycle.com