

# Steps to Food Safety Success for Dried Herb Producers

Angela Ferelli, PhD

Agent Associate, University of Maryland | [angfer@umd.edu](mailto:angfer@umd.edu)

Alec Loranca LEHS

Administrative Officer III, Maryland Department of Agriculture | [alecj.loranca@maryland.gov](mailto:alecj.loranca@maryland.gov)

# Maryland Food Safety Network




**Dr. Christopher Walsh**

University of Maryland, College Park  
[cswalsh@umd.edu](mailto:cswalsh@umd.edu)



**Dr. Angela Ferelli**

University of Maryland, College Park  
(302)-353-7159  
[angfer@umd.edu](mailto:angfer@umd.edu)  
@AMCFerelli 



**Carol Allen**

University of Maryland, College Park  
(240)-994-5043  
[callen12@umd.edu](mailto:callen12@umd.edu)



**Deanna Baldwin**

Maryland Department of Agriculture  
(410)-841-5769  
[produce.safety@maryland.gov](mailto:produce.safety@maryland.gov)



**Molly Gillingham**

Maryland Department of Agriculture  
(410)-841-5769  
[Molly.gillingham@maryland.gov](mailto:Molly.gillingham@maryland.gov)



**Alec Loranca**

Maryland Department of  
Agriculture  
(410)-841-5769  
[alecj.loranca@maryland.gov](mailto:alecj.loranca@maryland.gov)




**Sarah Everhart, Esq.**

University of Maryland Agriculture  
Law Education Initiative  
(410)-458-2475  
[severhart@law.umaryland.edu](mailto:severhart@law.umaryland.edu)



**Dr. Shauna Henley**

University of Maryland Extension  
(410)-887-8090  
[shenley@umd.edu](mailto:shenley@umd.edu)  
@FoodSmartUME 



**Dr. Melinda Schwarz**

University of Maryland  
Eastern Shore  
(410)-430-0763  
[mschwarz@umes.edu](mailto:mschwarz@umes.edu)

Check out our websites, subscribe to us on YouTube!

[psla.umd.edu/extension/produce-safety](https://psla.umd.edu/extension/produce-safety)

# Why is food safety important when making dried herb products?

- Since 1999 there have been 814 illnesses and 1 death in the US associated with herbs and spices foodborne outbreaks (NORS Dashboard, [www.cdc.gov/norsdashboard/](http://www.cdc.gov/norsdashboard/)).
- Pathogens of interest include *Salmonella enterica*, *Staphylococcus aureus*, *Bacillus cereus*, and *Clostridium botulinum*.

**Table 1. Estimated *Salmonella* prevalence (125 g) in spices offered for sale at retail establishments; samples collected November 2013-September 2014 or October 2014-March 2015.**

Spice Type <sup>a</sup>	Total No. of samples tested	No. of samples positive for <i>Salmonella</i>	<i>Salmonella</i> Prevalence (%)	Clopper and Pearson's 95% Confidence Interval (%)
Basil	529	1	0.19	0.0048-1.1
Black pepper	1,264	3	0.24	0.049-0.69
Coriander, grd	543	3	0.56	0.11 - 1.6
Cumin	549	0	0	0.00 - 0.67
Curry powder, grd	518	1	0.19	0.0049 - 1.1
Dehydrated garlic, grd	615	3	0.49	0.10 - 1.4
Oregano	669	1	0.15	0.0038 - 0.83
Paprika, grd	816	2	0.25	0.030 - 0.88
Red pepper, grd	633	4	0.64	0.17 - 1.6
Sesame seed, whole	526	0	0	0.00 - 0.70
White pepper, grd	588	0	0	0.00 - 0.63

# Why is food safety important when making dried herb products?

- Since 1999 there have been 814 illnesses and 1 death in the US associated with herbs and spices foodborne outbreaks (NORS Dashboard, [www.cdc.gov/norsdashboard/](http://www.cdc.gov/norsdashboard/)).
- Pathogens of interest include *Salmonella enterica*, *Staphylococcus aureus*, *Bacillus cereus*, and *Clostridium botulinum*.

**Table 2. Estimated Salmonella prevalence (750 g) in spice from shipments of imported spice offered for entry to the U.S.; samples collected FY2012-FY2015.**

Spice Type <sup>a</sup>	Total No. of samples tested	No. of samples positive for <i>Salmonella</i>	<i>Salmonella</i> Prevalence (%)	Clopper and Pearson's 95% Confidence Interval (%)	Comparison of <i>Salmonella</i> Prevalence at U.S. entry vs. Retail: Fisher Exact Test <sup>b</sup>
Basil	20	1	5	0.13-25	NS
Black pepper	223	15	6.7	3.8-11	$p < .0001$
Coriander, grd	92	17	18	11-28	$p < .0001$
Cumin	130	11	8.5	4.3-15	$p < .0001$
Curry powder, grd	177	7	4	1.6-8.0	$p = .0004$
Dehydrated garlic, grd	59	1	1.7	0.043-9.1	NS
Oregano	78	8	10	4.5-19	$p < .0001$
Paprika, grd	85	3	3.5	0.73-10	$p = .007$
Red pepper, grd	337	36	11	7.6-14	$p < .0001$
Sesame seed, whole	155	12	7.7	4.1-13	$p < .0001$
White pepper, grd	50	3	6	1.3-17	$p = .0005$

# How do we reduce food safety risk with dried herb products?

Following Good Agricultural Practices to produce the source material

Following a validated process

Sanitation and good housekeeping

Safe consumer handling and preparation



More risky

Less risky

# Good Ag. Practices that impact the safety and quality of fresh herbs



Agricultural products in Maryland are governed by different federal and state regulations



# Example of products in Maryland and associated regulation



	<b>Fruits and vegetables normally eaten raw</b>	<b>Fruits and vegetables not normally eaten raw</b>	<b>Value added - (Jams, Jellies, Juices)</b>	<b>Value added- Cut fresh produce</b>	<b>Value added- Dried vegetables and herbs</b>
<b>Applicable FSMA Rule</b>	Subject to PSR	Exempt from PSR	Preventive controls for human food	Preventive controls for human food	May Be Subject to PSR
<b>Eligible for GAP certification?</b>	Yes	Yes	No	Growing yes, cutting no	No
<b>Under purview of which MD governing body</b>	MDA	MDA	Could be covered by MD cottage food law depending on product	Process - requires a license from MDH	Process - requires a license from MDH



# Which license are you targeting?

Annual Sales*	Type of License	Basic Requirements
Under \$40,000	On-Farm home processing license	<ul style="list-style-type: none"><li>• Potable water</li><li>• Approved sewage disposal</li><li>• Plan review</li></ul>
Over \$40,000	Processing license	<ul style="list-style-type: none"><li>• Potable water</li><li>• Approved sewage disposal</li><li>• Plan review</li><li>• Commercial kitchen</li></ul>

\*Total sales of products approved for the processing license.



Your  
product's  
plan

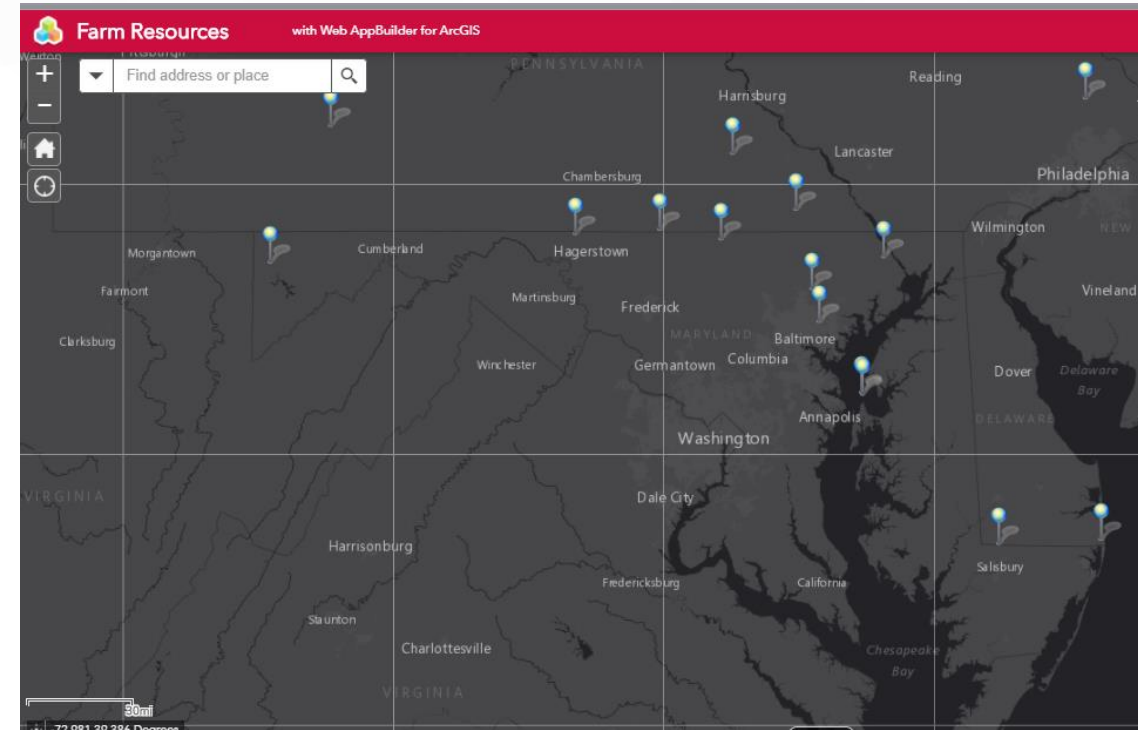


**These recommendations are NOT one size fits all.**

Your product may require additional or separate specifications. Contact MDH early and often for up-to-date, operation specific licensing requirements.

# Start here!

- Make a list of your intended products.
- Make a list of equipment you'll be using.
- Prep a description of planned processes → process flow diagrams can help with this.
- Contact MDH and state herb experts to discuss your proposed process.
- Get a water potability test.



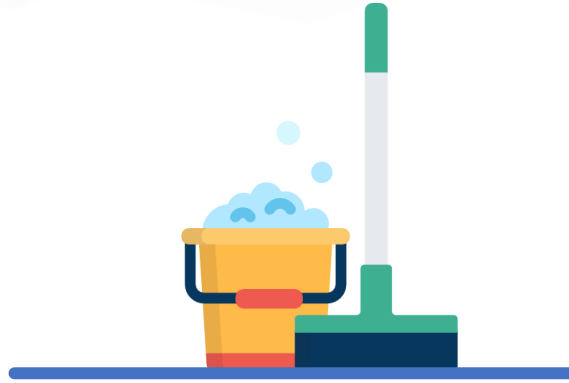
Maryland Map of Water Testing Labs  
[maryland.maps.arcgis.com/apps/webappviewer/index.html?id=4228cc4917f84bc3aea03a00992ea563](https://maryland.maps.arcgis.com/apps/webappviewer/index.html?id=4228cc4917f84bc3aea03a00992ea563)

# General facility requirements

Ventilation



Cleanable Building Surfaces



Sink



Shatterproof or Covered Lights



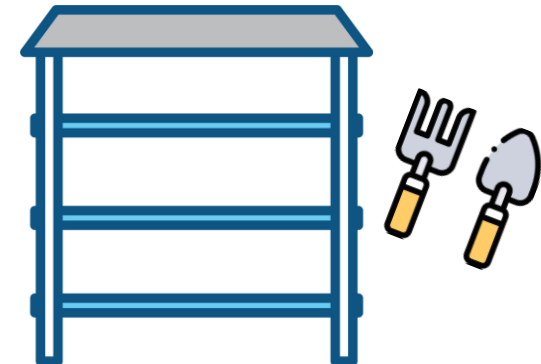
Bathroom



Waste Disposal

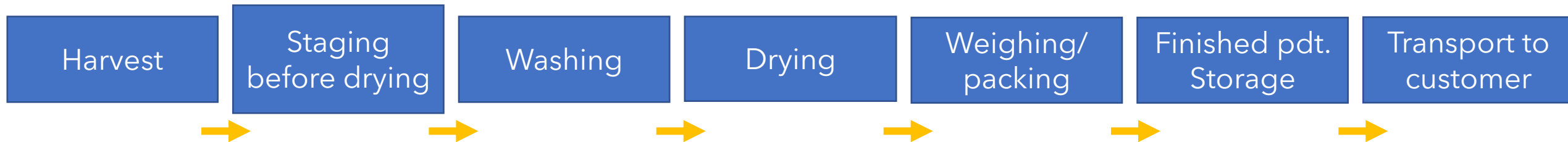


Sanitation Program for Equipment



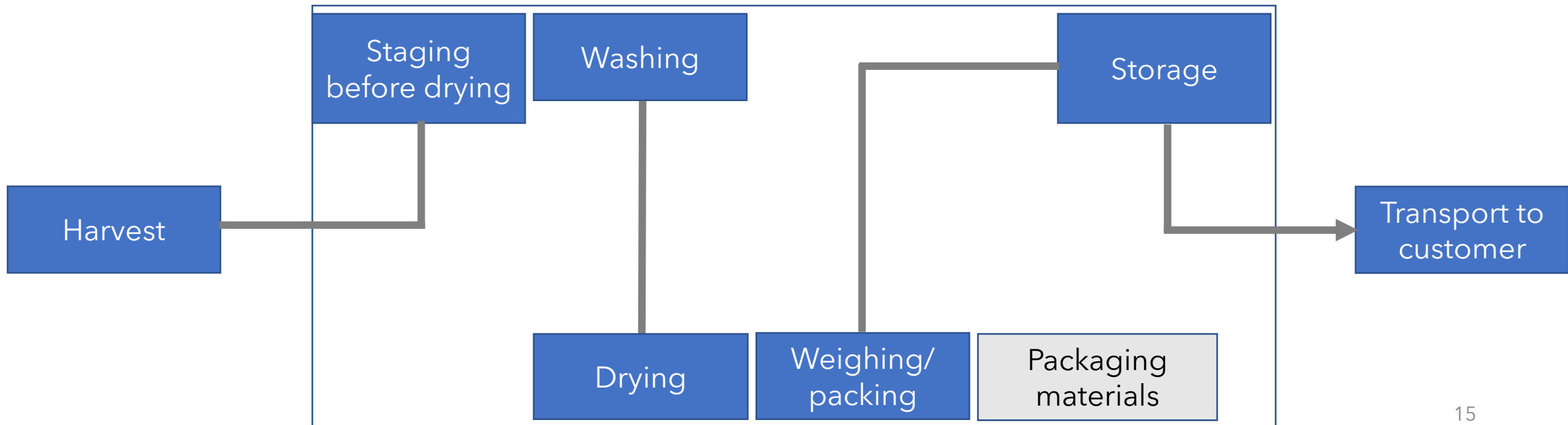
# Process flow diagrams

- Unidirectional flow is best to prevent cross-contamination of finished products by any hazards present in raw material.
- This can be achieved by separating activities in physical space or by time.



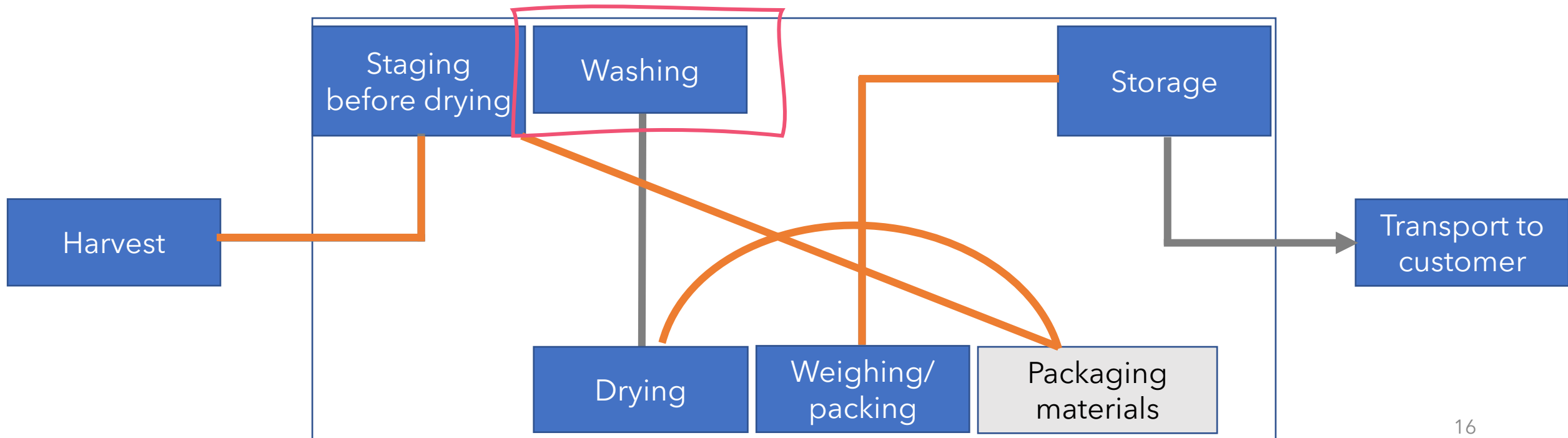
# Process flow diagrams

- Unidirectional flow is best to prevent cross-contamination of finished products by any hazards present in raw material.
- This can be achieved by separating activities in physical space or by time.



# Process flow diagrams

- Unidirectional flow is best to prevent cross-contamination of finished products by any hazards present in raw material.
- This can be achieved by separating activities in physical space or by time.





SOPS are needed for each step in your process flow

STANDARD OPERATING PROCEDURE (SOP)

SOP #: \_\_\_\_\_ Business Name: \_\_\_\_\_  
Version, Date of last review: \_\_\_\_\_

Purpose: \_\_\_\_\_ *What activity is this?* \_\_\_\_\_  
\_\_\_\_\_

Scope: \_\_\_\_\_ *Who does this apply to?* \_\_\_\_\_  
\_\_\_\_\_

Responsibility: \_\_\_\_\_ *What is your expectation?* \_\_\_\_\_  
\_\_\_\_\_

Materials needed: \_\_\_\_\_ *Include everything!* \_\_\_\_\_  
\_\_\_\_\_

Procedure:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ *Must be detailed. Anticipate confusion, use numbers and locations.* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Don't forget documentation!** checklists, logs, documents stating corrective step initiated (if needed)

- Harvest and staging
- Washing
- Dehydrating
- Weighing and packing
- Storage
- Distribution
- Sanitation SOPs

# The Harvest SOP

## *Important points to consider*

- Workers should be able to spot potential contamination (💩, etc.) and not harvest affected herbs.
- Harvesting bins and utensils should be clean before going to the field.
- Minimize harvested herb contact with the ground.
- Train workers on these and all your harvest expectations!



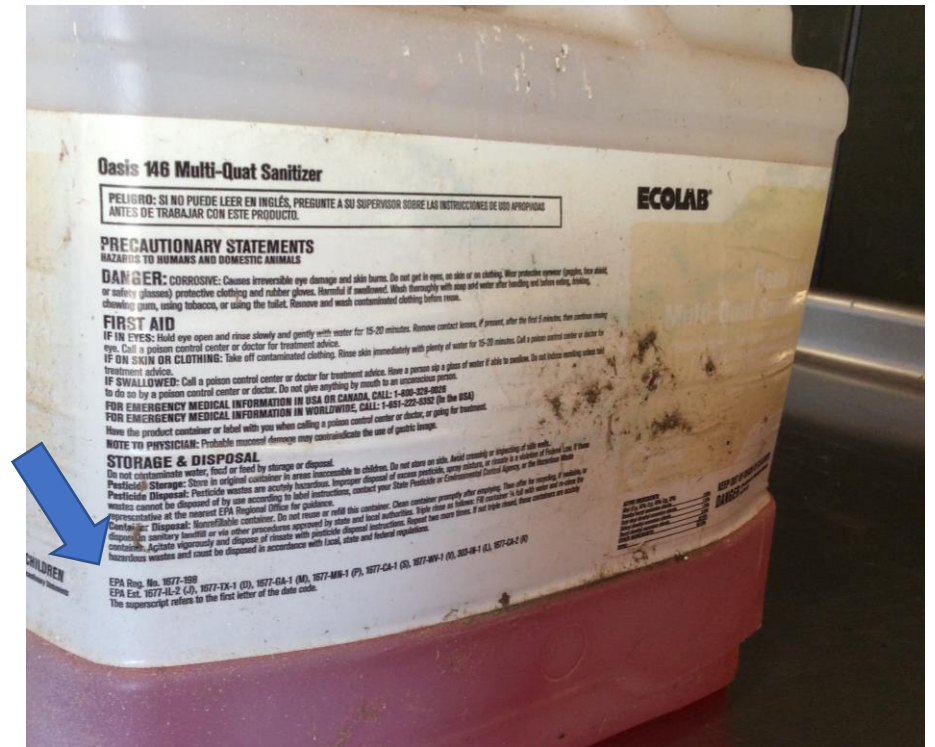
Photo credit: Carol Allen

# The Herb Washing SOP

## *Important points to consider*

- Herbs must be washed, but use of a sanitizer is optional.
- If you are using **recirculated water** (e.g. 3-compartment sink), sanitizer is highly recommended.
- Sanitizers in wash water primarily act to **inactivate pathogens in the water**, as opposed to produce surfaces.

**Your sanitizer must be labeled for use in produce wash water**



**EPA registration numbers can help you find to the up-to-date label**

# The Drying SOP

- Effective drying and subsequent storage temperature can control the growth of bacteria and molds.
- Your drying equipment and process will be thoroughly reviewed by MDH.
- Required criterion – controlled drying temperature for the appropriate amount of time to bring your product's **Water Activity ( $a_w$ )**  $< 0.85$ .
- Batch temperature, time in, and time out should be recorded.

# The Drying SOP: using Water Activity ( $a_w$ ) to verify your process

*What is water activity and why do I need to submit my product for analysis?*

- Water activity is the amount of unbound water in product.
- This data is important to verify that your process (drying time/temperature) is working effectively to reduce food safety risk.

*How often do I need to get  $a_w$  testing?*

Whenever you change a recipe or your drying process.

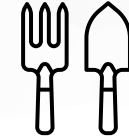
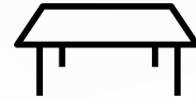
*Where do I go for testing?*

- If in the formulation stage, contact Dr. Melinda Schwarz at University of Maryland, Eastern Shore ([mschwarz@umes.edu](mailto:mschwarz@umes.edu)).
- If ready to submit a regulatory sample, Microbac (located in Baltimore and Warrendale, PA) can assist ([baltimore\\_food@microbac.com](mailto:baltimore_food@microbac.com)).

Food	$a_w$
Water	1.00
Apples, Fresh	0.99
Salami	0.88
Jam, Strawberry	0.84
Orange Juice Concentrate	0.80
Black Pepper, Pure Ground	0.72
Honey	0.55
Granola Bar	0.21

Adapted from:  
<https://onlinelibrary.wiley.com/doi/pdf/10.1002/9780470376454.app5>

# Sanitation SOPs



Sanitation SOPs cover:

- Your pest control program
- Cleaning, sanitizing, and maintaining equipment, food contact surfaces, packaging, and building
- Water
- Employ health, hygiene, and PPE
- Labeling and storage of chemicals

For cleaning and sanitizing SOPs, include:

- What is to be cleaned
- How to clean and sanitize
- How often to clean and sanitize
- Where it's stored after cleaning
- What records are used to monitor the procedures

Remember, cleaning ***always*** comes before sanitizing.

Be sure to use sanitizers according to their label directions → incorporate label directions on SSOP.

# Packaging considerations

## *Important points to consider*

- Store packaging in a clean area, separate from raw materials.
- You will submit a sample of your label(s) for plan review.
- Ensure label includes the following:

### Mint Tea

Angela's herbs | 28 ash Ave. Towson, MD 20732  
(410)-555-5551

0.5 oz

### Ingredients: Mint leaves

Instructions: Boil water to 212°F. Add 0.5 tsp to teacup. Pour boiled water over tea. Steep covered for 5 min.

# Traceability

- Create lot numbers to easily track your product as it flows out to your customers.
  - A **lot number** is a unique identifier for an amount of your product.
  - A basic lot number includes the product code and the dry date.

Product	Code
Basil	Ba
Lemon balm tea	Le
Mint	Mi
Energizer tea (mint and lemon balm)	En

Sample Code: Ba-137-21

Product code      Year

Julian dates - 1 to 365  
(This is May 17<sup>th</sup>)



# Traceability

- Create lot numbers to easily track your product as it flows out to your customers.
  - Use lot numbers when recording your sales.
  - When you become comfortable, you can use lot codes to perform a **traceability exercise**.
  - Traceability is an important component in **Recall-readiness**.

Product label	Lot number	Optional harvest date	Optional Package date	Optional Date sold	Customer	Units sold
Dried Basil	Ba-137-21				Greenbelt FM	15
Dried Basil	Ba-137-21				Retail store A	35
Lemon balm tea	Le-137-21				Greenbelt FM	5

# Summary

- Food safety is important for dried herb safety and superior quality.
- Establish an early relationship with MDH & herb experts → call often!
- Sit down with your team and devise a process flow.
- SOPs, SSOPs, and controls may be specific to your operation.

MARYLAND DEPARTMENT OF HEALTH OFFICE OF FOOD PROTECTION FACILITY AND PROCESS REVIEW - PLAN REVIEW SUBMISSION FORM 6 Saint Paul Street, Suite 1301, Baltimore, Maryland 21202 Phone 410-767-8400 · Fax 410-333-8931 · Toll Free 1-877-4MD-DHMH TTY for Disabled Maryland Relay Service 1-800-735-2258 · Web Site: <a href="http://phpa.dhmh.maryland.gov">http://phpa.dhmh.maryland.gov</a>				
PROJECT INFORMATION				
Establishment Name	Establishment Address	City	County	Zip Code
Project Description and Applicable Fees (Select Only One)				
<b>Retail Food Service Facility</b> If a Retail Food Service Facility, will 2 or more facilities be built from this plan in MD? * <input type="checkbox"/> Yes <input type="checkbox"/> No ** If yes, submit plans to this office. If no, submit to Local Health Dept. <input type="checkbox"/> Prototype (New construction) - \$300 <input type="checkbox"/> Prototype (Remodel) - \$300 <input type="checkbox"/> HACCP (Retail prototypes ONLY) - \$200 <b>On-Farm Home Processing</b> <input type="checkbox"/> On-Farm Processing - \$0 <input type="checkbox"/> On-Farm Meat Storage - \$0 <input type="checkbox"/> Producer Mobile Farmer's Market - \$0		<b>Food Processing and Warehousing</b> <input type="checkbox"/> Food Processing Plant (New Construction) - \$300 <input type="checkbox"/> Food Processing Plant (Remodel/Addition) - \$300 <input type="checkbox"/> Food Process Review Only - \$200 <input type="checkbox"/> Manufacturing Plant Operating in a Licensed Facility - \$200 <input type="checkbox"/> Food Warehouse (New Construction) - \$300 <input type="checkbox"/> Food Warehouse (Remodel/Addition) - \$300 <input type="checkbox"/> Shellfish Processing Plant - \$300 <input type="checkbox"/> Shellfish Shipper/Re-Shipper - \$0 <input type="checkbox"/> Frozen Dessert Facility - \$0		
Scope of Project: _____				
SITE INFORMATION				
Water Supply: <input type="checkbox"/> Public <input type="checkbox"/> Private		Zoning (select all that apply) <input type="checkbox"/> Commercial <input type="checkbox"/> Residential		
Sewage Disposal System: <input type="checkbox"/> Public <input type="checkbox"/> Private		<input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Maritime <input type="checkbox"/> Mixed		
CONTACT INFORMATION				
Plan Review Contact			Owner/Operator	
Name			Name	
Company Name		POSITION	Company Name	
Address		<input type="checkbox"/> Architect <input type="checkbox"/> Contractor <input type="checkbox"/> Expediter	Address	
City, State, and Zip			City, State, and Zip	
Phone #			Phone #	
Email			Email	
Mail Official Correspondence to (Select Only One): <input type="checkbox"/> Plan Review Contact <input type="checkbox"/> Owner/Operator				
The Following Must Be Provided, If Applicable. Missing/Incomplete Information Will Delay Your Review Retail/Processing- Check all that Apply				
<input type="checkbox"/> Architectural drawings (for new construction/ remodel/ additions) <input type="checkbox"/> Include: site and facility layout, reflected ceiling plan, plumbing diagram, mechanical plan (air balance), electrical plan, roof plan/venting, exhaust hood drawings/calculations (if applicable), finish schedule, elevation drawings <input type="checkbox"/> Equipment schedule and equipment specification sheets (one set, numbered in sequence to correspond to list/plan)			<input type="checkbox"/> Menu and HACCP Plan <input type="checkbox"/> List of all products (Processing) <input type="checkbox"/> Sample labels/packaging (Processing) <input type="checkbox"/> Product flow (Processing) <input type="checkbox"/> Sanitation Standard Operating Procedures (Processing) <input type="checkbox"/> Recall Plan (Processing) <input type="checkbox"/> Allergen Control Plan (Processing)	
<b>Please Submit Application with your plans along with the applicable payment to:</b> Make Check Payable to: MDH/Environmental Health Bureau, 6 St. Paul Street, Suite 1301, Baltimore, MD 21202 Only checks or money order are accepted Check number _____ Received by _____ Applicant Signature: _____ Date: _____				

# Selected references list

- Processing and Selling Value Added Food Products in Maryland  
[https://phpa.health.maryland.gov/OEHFP/OFPCHS/SiteAssets/Pages/plan-review/MDA%20MDH%20-%20Processing%20and%20Selling%20Value%20Added%20Food%20Products%20in%20Maryland\\_11-2019.pdf](https://phpa.health.maryland.gov/OEHFP/OFPCHS/SiteAssets/Pages/plan-review/MDA%20MDH%20-%20Processing%20and%20Selling%20Value%20Added%20Food%20Products%20in%20Maryland_11-2019.pdf)
- On-Farm Home Processing Plan Review Guidelines  
[https://phpa.health.maryland.gov/OEHFP/OFPCHS/SiteAssets/Pages/plan-review/On-Farm%20Home%20Processing%20Plan%20Review%20Guidelines\\_5-2019.pdf](https://phpa.health.maryland.gov/OEHFP/OFPCHS/SiteAssets/Pages/plan-review/On-Farm%20Home%20Processing%20Plan%20Review%20Guidelines_5-2019.pdf)
- COMAR 10.15.04.18 On-Farm Home Processing Licensing Procedure Step-by-Step  
[https://phpa.health.maryland.gov/OEHFP/OFPCHS/SiteAssets/Pages/plan-review/On-Farm%20Step%20By%20Step%20Process%20Licensing\\_5-2019.pdf](https://phpa.health.maryland.gov/OEHFP/OFPCHS/SiteAssets/Pages/plan-review/On-Farm%20Step%20By%20Step%20Process%20Licensing_5-2019.pdf)
- Plan Review Submission Form  
[https://phpa.health.maryland.gov/OEHFP/OFPCHS/Documents/Plan%20Review%20Application%20MDH%2004745\\_82318.pdf](https://phpa.health.maryland.gov/OEHFP/OFPCHS/Documents/Plan%20Review%20Application%20MDH%2004745_82318.pdf)
- Maryland Map of Water Testing Labs  
[maryland.maps.arcgis.com/apps/webappviewer/index.html?id=4228cc4917f84bc3aea03a00992ea563](http://maryland.maps.arcgis.com/apps/webappviewer/index.html?id=4228cc4917f84bc3aea03a00992ea563)
- On-farm Cleaning and Sanitizing Guide  
[drive.google.com/file/d/1Anox1Tmjn1yr7mfXMJhd0CPqELcbJMeU/view](https://drive.google.com/file/d/1Anox1Tmjn1yr7mfXMJhd0CPqELcbJMeU/view)
- Produce Safety Alliance: Introduction to Selecting an EPA Labeled Sanitizer  
<https://producesafetyalliance.cornell.edu/sites/producesafetyalliance.cornell.edu/files/shared/documents/Sanitizer-Factsheet.pdf>

# Questions?

...On Food Safety? Dr. Angela Ferelli  
(302) 353-7159 | [angfer@umd.edu](mailto:angfer@umd.edu)

...On Plan Review?  
(410) 767-8400 | [mdh.foodplanreview@maryland.gov](mailto:mdh.foodplanreview@maryland.gov)

...On Herb Production?  
Henriette den Ouden [hdenouden@umes.edu](mailto:hdenouden@umes.edu)

For Help with Water Activity ( $a_w$ ) Measurements  
Dr. Melinda Schwarz [mschwarz@umes.edu](mailto:mschwarz@umes.edu) | Microbac [baltimore\\_food@microbac.com](mailto:baltimore_food@microbac.com)