

Good Agricultural & Good Handling Practices for Produce

This workshop, as well as the others around the state, address key issues that growers face when tackling food safety certification. Get an overview of audit considerations and expectations, hear from auditors and from growers who have become certified, and get a buyer's perspective on the importance of food safety certification.

Thursday, February 17, 2011

9 a.m. – 3 p.m.

Lapeer County Michigan State University
Extension Office

287 W. Nepessing St, Suite 1
Lapeer, MI 48446-2104

RSVP required by Monday, February 14, 2011



Space is limited to the first 50 registrants, so save your spot early! You **MUST** register for these workshops to attend!

Contact Michigan Food & Farming Systems (MIFFS) for more information or to RSVP at (517) 432-0712 or miffs@msu.edu.

There is no cost to attend, but the value is more than \$50 per person, so don't miss it! Lunch will be provided, and participants can purchase the revised, 255-page "Wholesale Success: A Farmer's Guide to Selling, Post-Harvest Handling and Packing Produce" Manual.

Other workshop dates include:

Friday, March 11, 2011

9 a.m. – 3 p.m.

Kalamazoo Regional Educational Service Agency
(KRESA)
1819 East Milham Ave.
Portage, MI 49002

Thursday, March 31, 2011

9 a.m. – 3 p.m.

The University Center at Gaylord
80 Livingston Blvd.
Gaylord, MI 49735

Funding for these workshops was provided through a USDA Specialty Crop Block Grant. Partners and sponsors include: Michigan Food & Farming Systems (MIFFS), the Michigan Department of Agriculture and Michigan State University Extension.



**Michigan Food &
Farming Systems-MIFFS**
Bringing Farmers & Communities Together

MICHIGAN STATE
UNIVERSITY

Extension



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1819 East Milham Ave.
Portage, MI 49002

RSVP required by Monday, March 7, 2011



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for more information or to RSVP at
(517) 432-0712 or miffs@msu.edu or register
online at www.miffs.org/gapghp.

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Other workshop dates include:

Thursday, March 17, 2011

2 – 4 p.m.

Online Webinar

Register at www.miffs.org/gapghp

Thursday, March 24, 2011

2 – 4 p.m.

Online Webinar

Register at www.miffs.org/gapghp

Thursday, March 31, 2011

9 a.m. – 3 p.m.

The University Center at Gaylord
80 Livingston Blvd.
Gaylord, MI 49735

Funding for these workshops was provided through a USDA Specialty Crop Block Grant. Partners and sponsors include: Michigan Food & Farming Systems (MIFFS), the Michigan Department of Agriculture and Michigan State University Extension.



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Stakeholder Survey: Complete Set of Survey Responses

This survey was administered in December, 2011. Of the 8 partnering organizations asked to complete this survey, 7 did, providing a response rate of 87%. All survey responses were given in complete anonymity.

1. How would you rate each of the following aspects of the grant program?

	Ex	Good	Fair	Poor	D/K
Farm Food Safety workshops	43%	43%			14%
Farm Food Safety workshop materials	28%	43%	14%		14%
Food Safety Assurance (FSA) website		28%			71%
Webinar (on FSA website)		28%			71%
On-farm mock food safety audit	57%	14%			28%
Involvement of food safety experts	43%	43%	14%		
Involvement of food safety auditors	28%	14%	14%		57%
Involvement of specialty crop producers	43%	43%	14%		
Involvement of my organization	43%	4%	14%		
Use of MIFFS display at events	28%	14%	14%		43%

2. What was the most effective project activity this year? Why?

- Workshop 28%
- On-farm Audit 43%
- Removing fear of unknown in food safety
- Compilation of educational materials

3. What was the least effective project activity this year? Why?

- Involvement of MDARD GAP auditors
- Food Safety website not fully implemented
- Webinar - Low participation; possibly due to repetition of topic

The following list contains some behavioral changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

4. Because I supported this project, I now.....

	SA	Agree	Disagree	SD	D/K
Use the educational materials to assist specialty crop producers with farm food safety issues	86%				14%
Go to the Food Safety Assurance website for information	Website not launched – invalid item				
Direct specialty crop producers to the website for information					
Have a stronger relationship with MIFFS	71%	14%		14%	
Help producers write Farm Food Safety Plans	57%		28%	14%	
Help specialty crop producers conduct food safety audits	28%		57%	14%	

The following list contains some changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

5. Because I supported this project, I now...

	SA	Agree	Disagree	SD	D/K
Know more about Good Agricultural Practices	71%	14%			14%
Know more about Good Handling Practices	57%	14%	14%		14%
Know how to determine if a producer needs third party certification	28%	57%			14%
Know where to obtain information about farm food safety plans	57%	28%			14%
Have a better understanding of what is needed to conduct an on-farm audit	71%	14%			14%
Know more about the needs of Mi specialty crop producers	86%	14%			

The following list contains some attitudinal changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

6. Because I supported this project, I now...

	SA	Agree	Disagree	SD	D/K
Share in the responsibility of educating specialty crop producers	57%	28%			14%
Share in providing resources to support specialty crop producers in the development of farm food safety plans	43%	43%			14%
Feel that we have reduced the risks of microbial contamination of produce grown by Michigan's specialty crop producers	28%	57%			14%
Feel that we have reached a majority of specialty crop producers with educational workshops	14%	14%	28%	28%	14%
Feel that we have enhanced the ability of specialty crop producers to increase market share	28%	28%	43%		
Feel that we have increased the competitive advantage of specialty crop producers	28%	57%	14%		
Feel that this educational process should be expanded to involve direct-to-consumer producers	43%	14%	28%	14%	

7. Are there any other ideas or feedback about this topic that you would like to share with MIFFS?

- a. Continuing education and discussion of food safety efforts are needed to create greater acceptance and implementation of the management practices.
- b. On-farm training is a great outreach tool because of the easy environment. It enhances learning and can be a catalyst for learning communities among farmers around food safety concerns. Farmers learn best from each other.
- c.organizations are working together to reach Michigan's specialty crop producers and that can (continue to) happen with continued communication and collaboration
- d. there is not a one-size fits all food safety approach for growers. Food safety education is important, but not specifically rooted in GAP and GHP.

Please return this email survey to kmranger@frontier.com or fax to MIFFS at 517-353-7961, or mail a hard copy to 4520 W Pratt, Dewitt, 48820 by December 16, 2011. Thank-you!

Food Safety Stakeholder Survey (year)

This survey is being used to get your opinions on the *Food Safety Education for Michigan's Specialty Crop Producers* (Specialty Crop Block Grant Program) activities conducted by MIFFS. We are interested in your honest answers so we can improve this program for you and others in the future.

1. How would you rate each of the following aspects of the grant program?

	Excellent	Good	Fair	Poor	Don't Know
Farm Food Safety workshops					
Farm Food Safety workshop materials					
Food Safety Assurance (FSA) website					
Webinar (on FSA website)					
On-farm mock food safety audit					
Involvement of food safety experts					
Involvement of food safety auditors					
Involvement of specialty crop producers					
Involvement of my organization					
Use of MIFFS display at events					

2. What was the most effective project activity this year? Why?

3. What was the least effective project activity this year? Why?

The following list contains some behavioral changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

4. Because I supported this project, I now.....

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
Use the educational materials to assist specialty crop producers with farm food safety issues					
Go to the Food Safety Assurance website for information					
Direct specialty crop producers to the website for information					
Have a stronger relationship with MIFFS					
Help producers write Farm Food Safety Plans					
Help specialty crop producers conduct food safety audits					

The following list contains some changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

5. Because I supported this project, I now...

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
Know more about Good Agricultural Practices					
Know more about Good Handling Practices					
Know how to determine if a producer needs third party certification					
Know where to obtain information about farm food safety plans					
Have a better understanding of what is needed to conduct an on-farm audit					
Know more about the needs of Mi specialty crop producers					

The following list contains some attitudinal changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

6. Because I supported this project, I now...

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
Share in the responsibility of educating specialty crop producers					
Share in providing resources to support specialty crop producers in the development of farm food safety plans					
Feel that we have reduced the risks of microbial contamination of produce grown by Michigan's specialty crop producers					
Feel that we have reached a majority of specialty crop producers with educational workshops					
Feel that we have enhanced the ability of specialty crop producers to increase market share					
Feel that we have increased the competitive advantage of specialty crop producers					
Feel that this educational process should be expanded to involve direct-to-consumer producers					

7. Are there any other ideas or feedback about this topic that you would like to share with MIFFS?

Please return this email survey to () by () . Thank-you!

FOR OFFICE USE ONLY: Grant Name: _____ Funding Source: _____ Staff Initials: _____

Attachment F

Checklist of Potential On-Farm Food Safety Risks

As a grower you're used to looking at your farm with production in mind. Creating a food safety or GAP Manual requires you to use a different set of eyes. This can be difficult if you have never thought of the food safety risks on your farm.

Below, you'll find a list of potential risks grouped by major category. If the risk applies to your farm, put a check mark by it and you'll know to address it when writing your GAP Manual. The list is not exhaustive, but is meant to be a starting point to get you thinking about potential food safety risks.

Manure

- ◇ Do you apply manure to your production area?
- ◇ Do you apply compost to your production area?
- ◇ Are your production areas within a mile of livestock?
- ◇ Are wildlife present on or near your farm?
- ◇ Are there any potential wildlife habitat areas (woods, wetland, river) near your production area?

Water

- ◇ Do you draw water for production from surface water sources or wells?
- ◇ Are there any surface water areas prone to flood into the production area?
- ◇ Is produce wash water either potable or sanitized?
- ◇ Is water used for washing within 10 degrees of the temperature of the produce?
- ◇ Is the water distribution system (pumps, valves, etc.) in good repair?

Worker Sanitation

- ◇ Do workers wash their hands before entering the production area, after smoking, after breaks, after lunch and after using the restroom?
- ◇ Do workers use the toilet instead of using the field?
- ◇ Do workers place used toilet paper in the toilet?
- ◇ Can workers recognize sick co-workers?

Facility Sanitation

- ◇ Do you clean and maintain all equipment?
- ◇ Do you clean and sanitize all food contact surfaces?
- ◇ Is transportation equipment regularly cleaned and sanitized?

Good Agricultural Practices (GAP) and Good Handling Practices (GHP) Internet Resources

These are supplemental resources found on the internet. They are here to enable you to do more studying or research on your own. Use them to inform your planning effort. They were not developed specifically for Michigan and may apply to earlier versions of a GAP program.

- **Michigan State University Extension- Agrifood Safety Workgroup Website**

- <http://gaps.msue.msu.edu/>

- **Web Soil Survey**

- USDA NRCS: <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>
- Tool for generating aerial maps that also label soil types

- **Google Maps**

- Google: <http://maps.google.com/maps?hl=en&tab=wl>
- Tool for generating aerial maps

- **2010 MSU GAP Manual for Fruit and Vegetables- 85 pages**

- Northwest Michigan Horticultural Research Station: <http://www.maes.msu.edu/nwmihort/gap.html>
- This template for making a farm food safety manual has been updated to comply with the new USDA GAP Checklist

- **Step by Step Procedure to Compile Manual**

- University of Idaho: <http://www.kimberly.uidaho.edu/potatoes/gap.htm>
- Updated to correspond to new USDA GAP Checklist

- **Farm Food Safety Plan**

- University of Maine- Potato Program: www.umaine.edu/umext/potatoprogram/gap_good_agricultural_practices.htm
- They are being updated to comply with new USDA GAP Checklist

- **Good Agricultural Practices Network for Education and Training**

- Cornell University: <http://www.gaps.cornell.edu/educationalmaterials.html>
- Order video tapes to help train employees on worker hygiene, signage for hand washing and proper restroom use, and other reference materials

- **Gemplers: Agricultural Supply Company**

- Order video tapes to help train employees: <http://www.gemplers.com/safety-videos>
- Order signage in English or Spanish: <http://www.gemplers.com/signs-labels>

- **Good Agricultural Practices: A Self Audit for Growers and Handlers include California references to rules and regulations—54 pages**

- UC Davis: <http://ucce.ucdavis.edu/files/filelibrary/5453/4362.pdf>

- **Summary reference document: A Combination of: Key Points of Control and Management of Microbial Food Safety: Information for Growers, Packers, and Handlers of Fresh-Consumed Horticultural Products—7 pages**

- UC Davis: http://ucgaps.ucdavis.edu/documents/UC_ANR_GAP_Series3574.pdf

- **On-line Self Audit Quizzes Categorized by Area of Concern with automatic scoring**
 - UC Davis: http://groups.ucanr.org/UC_GAPs/GAP_Self-Audits/
 - Answers to the questions asked are elaborated on in the first document listed above.

- **Good Agricultural Practices**
 - New England Extension Services
 - <http://www.ipm.uconn.edu/IPM/foodsafety/toc.htm>
 - Bulletins on several key topics- each are short, but to the point
 - Worker Health & Hygiene in the Field
 - Worker Health & Hygiene in the Packing House
 - Sanitation at several levels
 - Manure/Biosolids Management Practices
 - Voluntary GAP audit form from 2002

- **Good Worker Health and Hygiene Practices: Training Manual for Produce Handlers- 11 pages produced in 2004**
 - Univ. of Florida: <http://edis.ifas.ufl.edu/pdffiles/FY/FY74300.pdf>

- **Good Worker Healthy and Hygiene Practices: Evaluation and Importance in GAPs and GMPs- 7 pages revised in 2007**
 - Univ. of Florida: <http://edis.ifas.ufl.edu/pdffiles/FY/FY71600.pdf>
 - Brief text with an example of a worker health and hygiene evaluation

- **Good Agricultural Practices for Pennsylvania Fruit and Vegetable Growers—68 pages published 2007. Penn State: http://foodsafety.psu.edu/gaps/psu_usda_gaps_1.3_2007.pdf**
 - Specific Instructions for each segment of the GAP Audit from 2007

- **Farm Food Safety Brochure** key points on 2 page brochure
Penn State: <http://pubs.cas.psu.edu/FreePubs/pdfs/uk185.pdf>

- **Microbial Food Safety IS Your Responsibility!**
 - UC Davis: <http://ucce.ucdavis.edu/files/filelibrary/5453/6558.PDF>
 - Background information for common problem microbes and why you should have a food safety plan. 7 pages.

- **Produce Traceability and Traceback: From Seed to Shelf and Beyond**
 - UC Davis Professor writes in Food Safety Magazine:
<http://www.foodsafetymagazine.com/article.asp?id=2908&sub=sub1#Suslow>
 - What is traceability and why do we need it. Industry needs for traceability systems. 7 pages

- **Worker Hygiene Keeps Produce Clean**
 - The Center for Innovative Food Technology:
 - <http://www.cift.eisc.org/foodsafety/worker-hygiene.php>
 - A news-like article with information from GAP training program

- **On Farm Waste Management Fact Sheets & Bulletins**
 - Rutgers: <http://njaes.rutgers.edu/pubs/subcategory.asp?cat=4&sub=31>
 - Several bulletins on using biosolids under New Jersey requirements

- **GAP Program Document**
 - Sunkist: http://www.sunkist.com/growers/ag_practices/SOPs.doc
 - Document that Sunkist uses to confirm growers are using GAPs
 - Good example of what buyers are expecting to address various risks 10 pages.

Food Safety Auditors

Prepared by Tom Kalchik
Michigan State University Product Center

January 2010

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INTRODUCTION

Good Agricultural Practices (GAP) is a series of on-farm practices designed to minimize the risk of food contamination, maintain a clear record of how food was produced, handled and stored; and ensure people buying produce that it is coming from a clean, well-managed environment. The application of the practices on a farm may be verified by third party audits, depending on the policies of the customer. (Adapted from Wholesale Success: A Farmer's Guide to Selling, Postharvest Handling and Packing Produce, published by FamilyFarmed.org; and USDA Fresh Audit Verification Program).

For more information about GAP, please visit the national GAPsNET site at <http://www.gaps.cornell.edu/>.

Producers who are preparing for a GAP audit can receive assistance from one of the following Michigan State University Extension Educators. Contact the person in your area to discuss your needs:

Steve Fouch County Extension Director Benzie County 448 Court Place PO Box 349 Beulah, MI 49617 (231) 882-0025 fouch@msu.edu	Chris Long Crop and Soils Science Specialist Campus 412 Plant and Soil Science Bldg East Lansing, MI 48824 (517) 355-0271 x1193 longch@msu.edu	John Pullis ANR Educator Presque Isle County 151 East Huron Ave PO Box 110 Rogers City, MI 49776 (989) 734-2168 pullisj@msu.edu	Hannah Stevens District Vegetable Educator Macomb County Verkuilen Building 21885 Cunham Road Clinton Township, MI 48036 (586) 469-6440 stevensh@msu.edu
Carlos Garcia Small Fruit Educator Ottawa County 12220 Fillmore Street Suite 122 West Olive, MI 49460 (616) 994-4580 garcias4@msu.edu	Norm Myers County Extension Director Oceana County 210 Johnson St Hart, MI 49420 (231) 873-2129 myersn@msu.edu	Bill Steenwyck District Vegetable Educator CHES 9302 Portland Rd Clarksville, MI 48815 (616) 693-2193 steenwyck@msu.edu	Phil Tocco ANR Educator Jackson County 1715 Lansing Avenue Suite 257 Jackson, MI 49202 (517) 788-4292 tocco@msu.edu

NOTE: BEFORE SELECTING AN AUDITOR, PRODUCERS ARE ADVISED TO CONTACT THEIR BUYER(S) ABOUT THEIR REQUIREMENTS FOR GAP AUDITS AND AUDITORS.

<u>COMPANY</u>	<u>LOCATION</u>	<u>CONTACT INFO</u>	<u>DESCRIPTION</u>	<u>SERVICES OFFERED</u> (Ag/Food Safety Only)	<u>COST</u>
AIB International	1213 Bakers Way PO Box 3999 Manhattan, KS 66505	E-mail (for agricultural audits): bernst@aibonline.org Phones: Phone: 800-633-5137 Fax: 785-537-1493 Website: https://www.aibonline.org/	Qualified to conduct certification audits for GFSI (BRC Global and SQF)	<u>Agricultural Audits</u> – validates food safety program for retailers, strengthen GAP and food safety on ranch/farm evaluates programs and processes	Contact the AIB office for an estimate of audit costs and other services
NSF Davis Fresh	NSF Davis Fresh 195 Aviation Way, Suite 101 Watsonville, CA 95076	Email: solutions@nsfdavisfresh.org Telephone: 831-768-7951 Fax: 831-768-7921 Website: http://www.nsf.org/ or http://www.nsf.org/business/nsf_davis_fresh/index.asp?program=DavisFre	Provider of food safety solutions for the produce industry, including growers, shippers, processors, distributors, and retailers across the country and around the world. Delivers field evaluations, laboratory testing, consulting, and training so to supply customers with the safe, consistent produce. Provides its customers with audit templates, updates to criteria, user-friendly information, and enhanced reporting.	<u>Davis Fresh</u> – GAP certification. Field evaluations, lab testing, consulting and training. <u>GFSI Certification</u> - NSF Davis Fresh is recognized provider of third-party audits with expertise in BRC, SQF, and GlobalGAP. <u>Organic Food Certification</u> – certifies to NOP standards.	Contact the Davis Fresh office for an estimate of audit costs and other services.
Primus Labs	2810 Industrial Parkway Santa Maria, CA 93455	E-mail (for field audits scheduling): Go to www.primuslabs.com/cus/ Phone: 800-779-1156 Fax: 805-922-2462	Provides GAP audits designed to provide buyers and sellers an effective supply chain review of their safety and/or quality programs, including BRC and GLOBALGAP.	Third party verification for the client's safe food production program. Primuslabs.com auditors conduct the following audits: ranch audits, harvest crew audits, cooling/cold storage audits, packing house audits, processing facility audits, and greenhouse audits. These audits cover industry established guidelines for Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP). HACCP modules can be requested for Packinghouse and processing audits. <u>Organic Food Certification</u> – certifies to NOP standards.	Contact the PrimusLabs office for estimate of audit costs and other services..

<u>COMPANY</u>	<u>LOCATION</u>	<u>CONTACT INFO</u>	<u>DESCRIPTION</u>	<u>SERVICES OFFERED</u> <u>(Ag/Food Safety Only)</u>	<u>COST</u>
USDA	<p>1400 Independence Avenue SW Room 1661, Stop 0240 Washington, D.C. 20250-0240</p> <p>Michigan: Michigan Department of Agriculture P.O.Box 30017 Lansing, MI 48909</p> <p>USDA, AMS Fresh Products Branch Park Place Office Center 7445 Allen Road, Suite 108 Allen Park, MI 48101</p>	<p>Kenneth S. Petersen Audit Programs Coordinator Fresh Products Branch USDA, AMS, Fruit and Vegetable Programs Phone: (202) 720-4560 FAX: (202) 720-8871 E-mail: ken.petersen@usda.gov</p> <p>Colleen Bess Phone: 517-373-0280 E-mail: collierc@michigan.gov</p> <p>Robert McCully Phone: 517-241-2978 E-mail: McCullyR@michigan.gov</p> <p>Michael Moore Phone: 313-928-0954 E-mail: michael.moore@usda.gov</p>	<p>AMS, in partnership with state departments of agriculture, offers a voluntary, audit based program that verifies adherence to the recommendations made in the Food and Drug Administration's Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables.</p>	<p>GAP for primary producers and GHP (Good Handling Practices) for packing, storage and wholesale distribution.</p> <p>NOTE: Program requirements have changed as of November 9, 2009 to incorporate the traceback portions as a mandatory component of GAP and GHP audits rather than a voluntary component.</p>	<p>\$92/hour for travel time and audit time (MI information)</p>

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Good Agricultural Practices

for Small Fruit Growers





If I learn only 1 Thing....

It's that every unique operation needs to have GAPs that are tailored by commodity and management practices in order to effectively reduce microbial risks and prevent contamination on each farm everyday.



Two Types of Food System Standards

Public standards

- **Government laws and regulations (Federal, State, Local)**
- **International Trade: Codex Alimentarius Commission**
- **Tend to focus primarily on risks due to food hazards**

Private Standards

- **Driven by the food industry: retail buyers, buyer organizations, commodity groups, NGOs, etc.**
- **Often consider food hazards (perhaps not risk-based) as well as environmental issues and corporate social responsibility objectives.**

Why Should We Care?

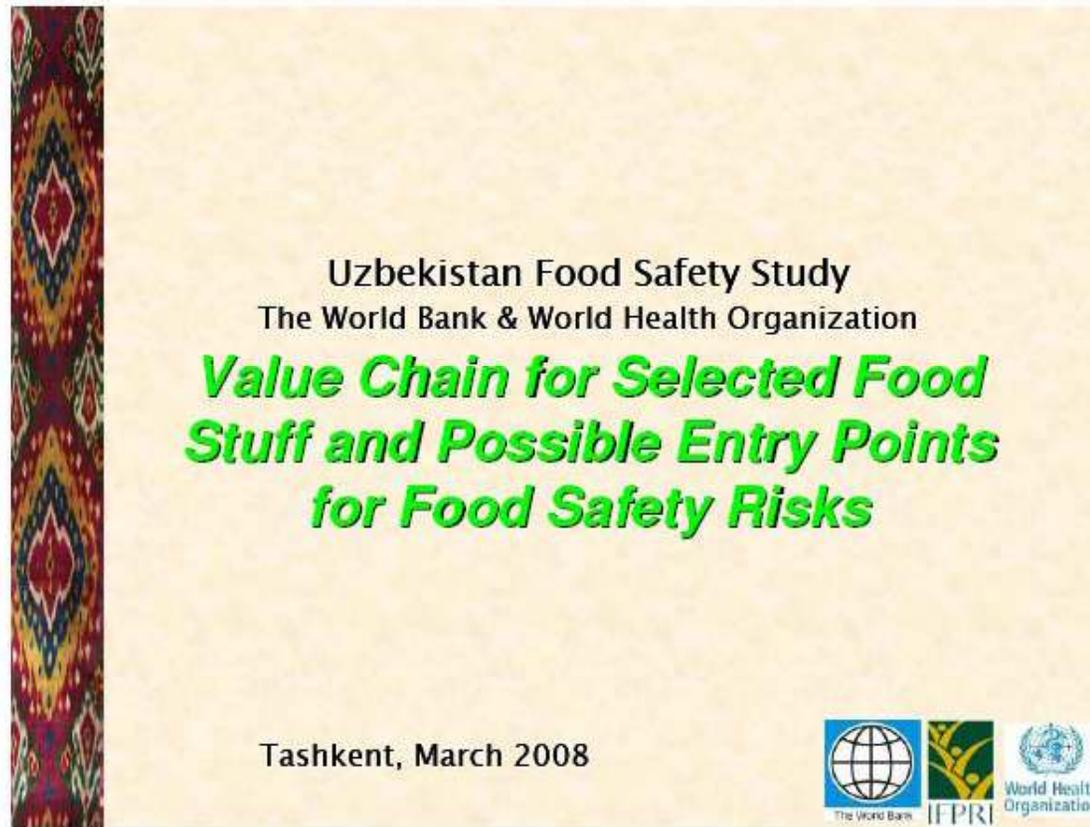
Every year foodborne illnesses result in an estimated:

- **48 million cases of foodborne illness.**
- **Less than 200,000 are produce related.**
- **Economic losses between 10-83 billion dollars.**

Produce Associated Outbreaks Affect Business



Global Shifts in Scope





**PREVENTION is the Key to
Reducing Microbial Contamination
of Fresh Fruits and Vegetables**

What Can We Do To Minimize the Risks?

Focus on risk reduction, not risk elimination.

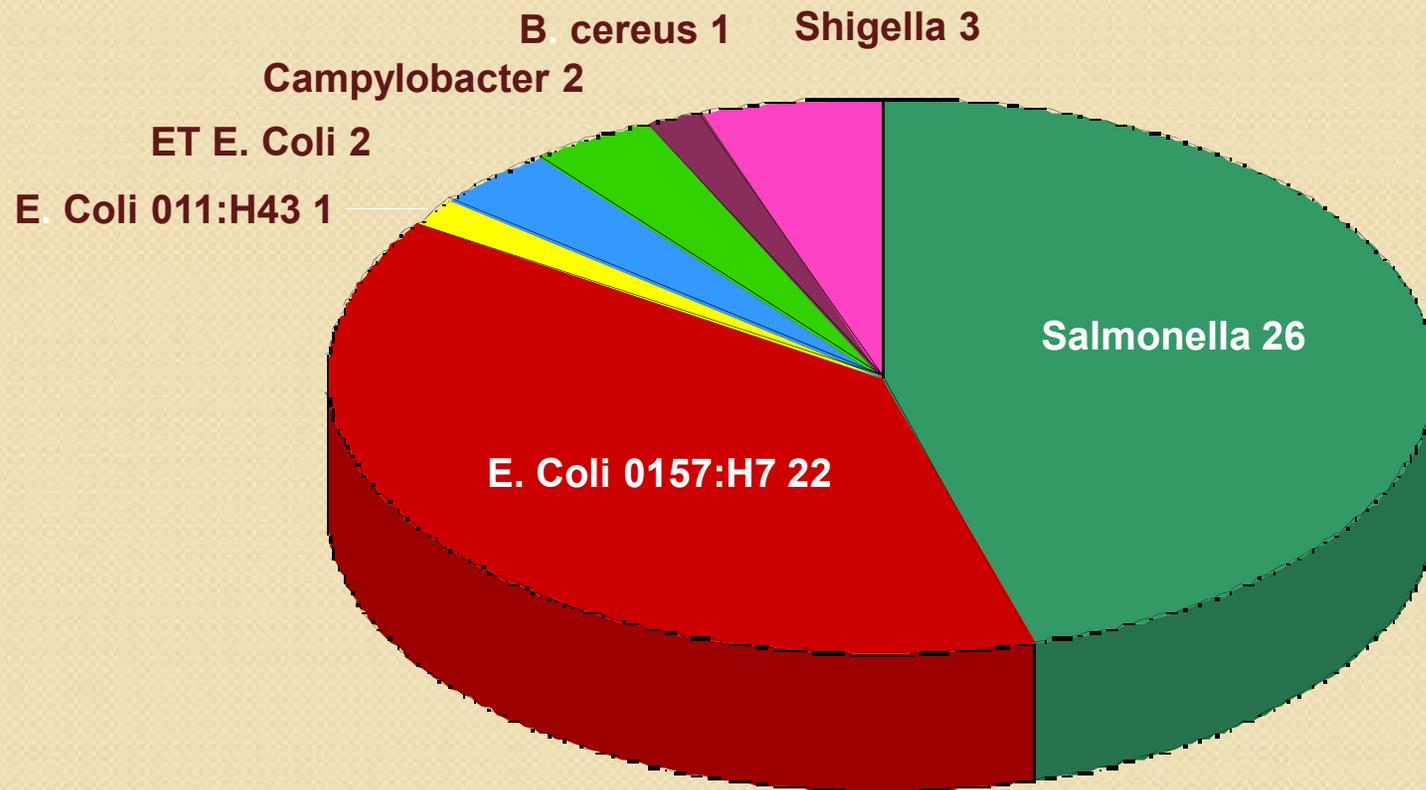
“Current technologies cannot eliminate all potential food safety hazards associated with fresh produce that will be eaten raw.”

Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables

Good Agricultural Practices to Reduce Risks of Microbial Contamination



FRUIT AND VEGETABLE BACTERIAL OUTBREAKS: 1988 - 1998



Source: CDC Foodborne outbreak surveillance system

Contamination With Microbial Pathogens: Where Can It Occur?

- **In fields or orchards**
- **During harvesting and transport**
- **During processing or packing**
- **In distribution and marketing**
- **In restaurants and food service facilities**
- **In the home**

FARM to FORK

Evaluate the Whole Operation

Pre-plant to Post-Harvest

- **Irrigation and Wash Water Sources**
- **Manure Source, Use, and Handling**
- **Employee Training and Hygiene**
- **Farm and Equipment Sanitation**

Reduce Post Harvest Loss

- **Post-harvest management practices that reduce loss to spoilage or shrinkage will reduce risks.**
- **These include sorting, quick cooling, chlorinated wash water, and good refrigerated storage and shipping.**



Review Field Management Practices to Reduce Risks

- **Manure**
- **Water quality**
- **Worker and field sanitation**
- **Post harvest handling**
- **Transportation**



Manure = Fecal Matter = Microbes

- **Human or animal: DO EVERYTHING you can to keep manure off produce.**
- **Preventing contamination is the goal.**



Manure



- **Manage compost piles to achieve high temperatures to kill potential pathogens.**



- **Time application properly.**



- **Know the source.**

Exclude Animals and Children

- **Keep wildlife out of production areas as much as possible.**
- **Manage rodents and birds in packing houses and storage areas.**
- **No dogs, cats or children in the fields.**



Water Carries Pathogens

- ***E. coli* 0157:H7** viewed primarily as a water-borne pathogen.
 - Many outbreaks associated with recreational water.
- ***Salmonella*, *Giardia* and *Cyclospora*** outbreaks on produce caused by contaminated water.



Water Management

- **Know the source of the water and intended use.**
- **Evaluate the irrigation method.**



- **Test water at least annually for generic E. coli and keep records of all water test results.**

Spray Water Quality

- **Use potable (drinking) water for pesticide sprays.**
- **When potable water is not available, test water quality and keep records.**
- **Low water volumes reduce risk.**

Why Focus on Water Disinfection?

Singular critical point capable of amplifying an error in sanitation or hygiene management during production, harvest, or postharvest



Chlorination of Water

Chlorination reduces contamination

- Maintain constant chlorine by monitoring. In general 100-150 ppm.
- Monitor pH of water. Optimum range 6.0-7.0
- Be conscientious of the temperature of the water. High temp. results in quicker pathogen kill, but also results in rapid loss of chlorine due to gas formation.

Wash Water Quality



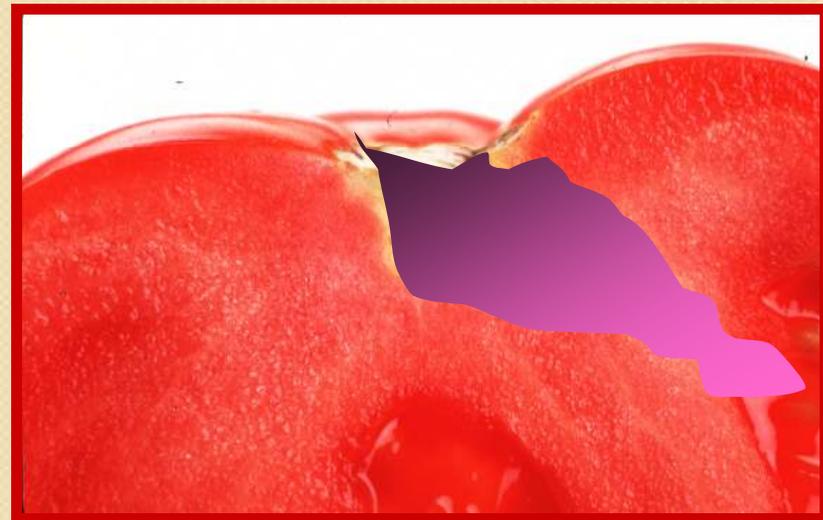
- Use potable water for all produce washing, cooling, dipping, icing, and processing.
- Avoid water temperatures in dump tanks that are more than 10°F cooler than produce.

Postharvest Water Disinfection Strategies

- Some Options: Chlorine gas, Sodium hypochlorite, Calcium hypochlorite, Chlorine dioxide, Acidified sodium chlorite, Surfactants, Ozone, Ionizing radicals, Hydrogen peroxide, Peroxyacetic acid, Ultraviolet Illumination.
- Monitoring effectiveness is paramount to success.
- Additional Resource: *Introduction to ORP as a Standard of Postharvest Water Disinfection Monitoring*, Trevor Suslow, UC Davis.

Bacteria can enter the stem scar with improper handling or wash water management

Fruit pulp must be $< 10^{\circ}\text{F}$ warmer than water temperature to prevent infiltration.



Postharvest water disinfection is an important preventive practice, even for an acid vegetable like tomatoes. Historically thought to be safe, outbreaks in 1990, 1993, and 1999 were caused by *Salmonella* spp.

Harvest Considerations

- **Ideally pick dry fruit or vegetable.**
- **Leave fruit that has bird droppings on it.**
- **Clean and sanitize totes daily.**
- **Cool product quickly.**
- **Teach workers about proper handwashing.**



Promote Cleanliness at U Pick

- **Invite customers to wash their hands prior to entering the fields.**
- **Provide clean and convenient restrooms for customer use.**
- **Supply soap, clean water, and single-use towels for hand washing.**





What is Proper Handwashing?

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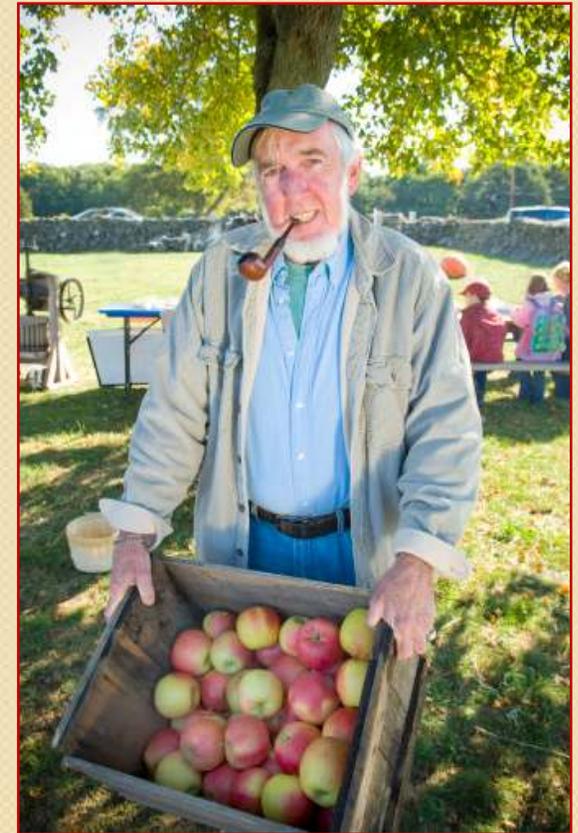


Proper Handwashing

- **Reduces infection 35 to 50%**
- **Reduces GI-illness up to 80%**

Farm Worker Hygiene

- **Teach workers about food safety and their role in preventing microbial contamination of fresh fruits and vegetables.**
- **Provide clean restrooms with soap, water, and single-use towels.**
- **Enforce proper use of facilities.**



Is Worker Training Really a Priority?

- **Farm workers are your first line of defense.**
- **Workers are capable of learning about food safety.**
- **Effective training results in better employees and safer produce.**



Harvest Sanitation

- **Clean and sanitize storage facilities prior to harvest.**



- **Clean and sanitize harvest bins daily.**



- **Avoid standing in harvest bins.**

- **Clean and sanitize packing area, equipment, and floors daily.**

Growers Are Innovating Their Own On-Farm Sanitation Routines



Develop a System for Maintaining Carton and Tote Hygiene



Packing House Sanitation

- **Proper sorting and culling of produce.**
- **Detectable Free Chlorine in Wash Waters.**
- **Enforce Good Worker Hygiene.**
- **Exclude all animals from Packing Shed, especially insects, birds and rodents.**
- **Clean and Sanitize Equipment.**



Control Sources of Rodent and Bird Contamination



Transportation and Distribution Cleanliness and Sanitation

❖ Pre-clean and Pre-rinse





Shipping Container Sanitation is Critical

- **Ask the freight company for a detailed log of previous loads.**
- **Ask them to clean and sanitize containers between loads.**
- **Inspect the truck that transports your produce.**



Transportation Unit Inspection Checklist

- **Is the area where food will be loaded dirty?**
- **Does the loading area smell bad?**
- **Is there any water condensation on the walls?**
- **If the fresh commodity requires refrigeration during transportation, is the refrigeration equipment functioning properly?**

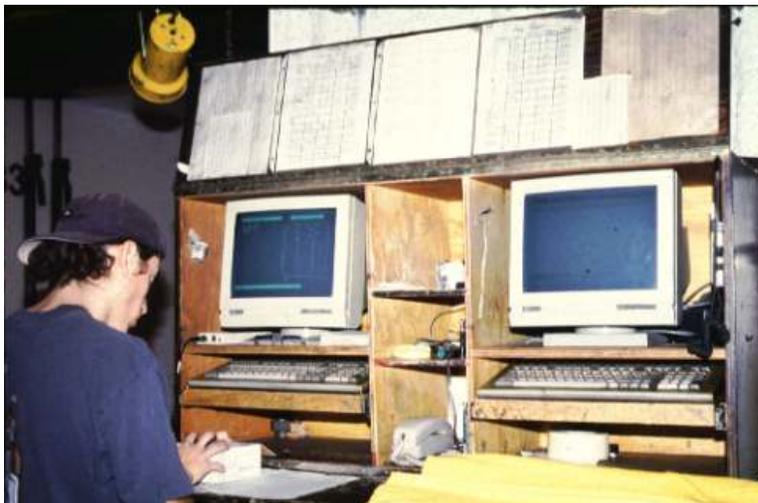


Refrigerated trailer in good condition.



Damaged air delivery chute in a refrigerated trailer.

Traceback and Positive Lot Identification



What is a Farm Food Safety Plan?

A “roadmap” for actively reducing food safety risks on the farm.

- Manure storage and handling

Record It or Regret It !

- Irrigation and water quality
- Equipment sanitation
- Harvest and post harvest handling
- Employee training
- Crisis management



Developing a Farm Food Safety Plan

- List what you do from planting preparation to postharvest handling
- Pay attention to where contamination is a risk.
- How can you monitor or measure the risk?
- Consider changes to reduce risk.
- Document changes and continue to measure or monitor the risk.



If you did not **RECORD IT**,
you did not do it.

- **Record keeping allows you to keep track of farming operations and worker training.**
- **Record keeping documents your activities should this information ever be required.**

Points to Remember in your GAP Manual

- All the auditor is looking for is “Do you have a plan?” and, “Are you carrying it out?”
- Daily means daily.
- More documentation is better than less.





Points to Remember on the Audit

- Have your documents in order.
- Be nice to the auditor.
- Auditors will walk your fields looking for hazards, like...
 - Trash
 - Signs of animals
 - Broken or leaky equipment.

Good Agricultural Practices for Managing Food Safety Risks Continue to Evolve



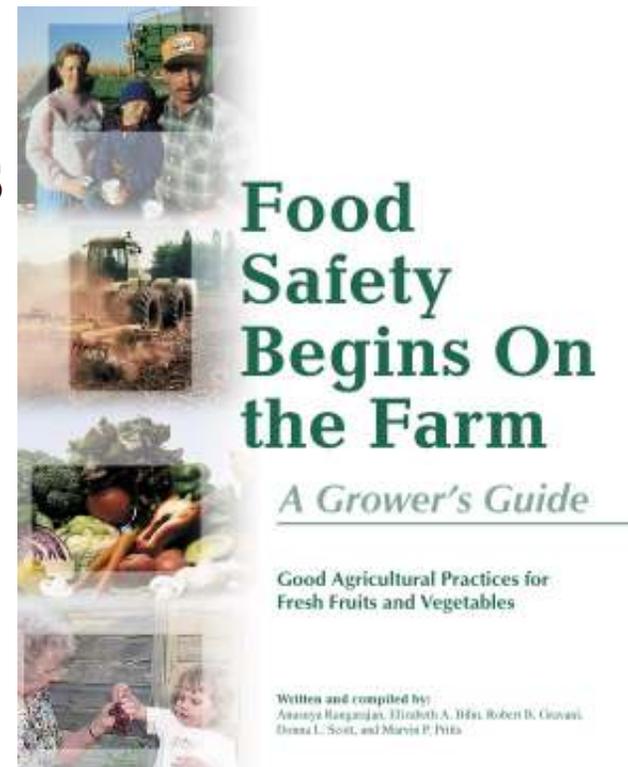
As new research becomes available, recommended practices may change.

Be Active and Be Ready

- **Make changes to management practices as needed.**
- **Keep good records of all production practices.**
- **Teach employees the importance of prevention strategies and provide proper facilities.**
- **Update your plan at least annually.**

Many Resources are Available to Growers and Packers

- **Grower's Guide**
- **A Quick Look at GAPs**
- **CD-ROM**
- **Resource Manual**
- **Farm Checklist**
- **Exhibit & Posters**
- **Farm Worker Education Materials**



Acknowledgements

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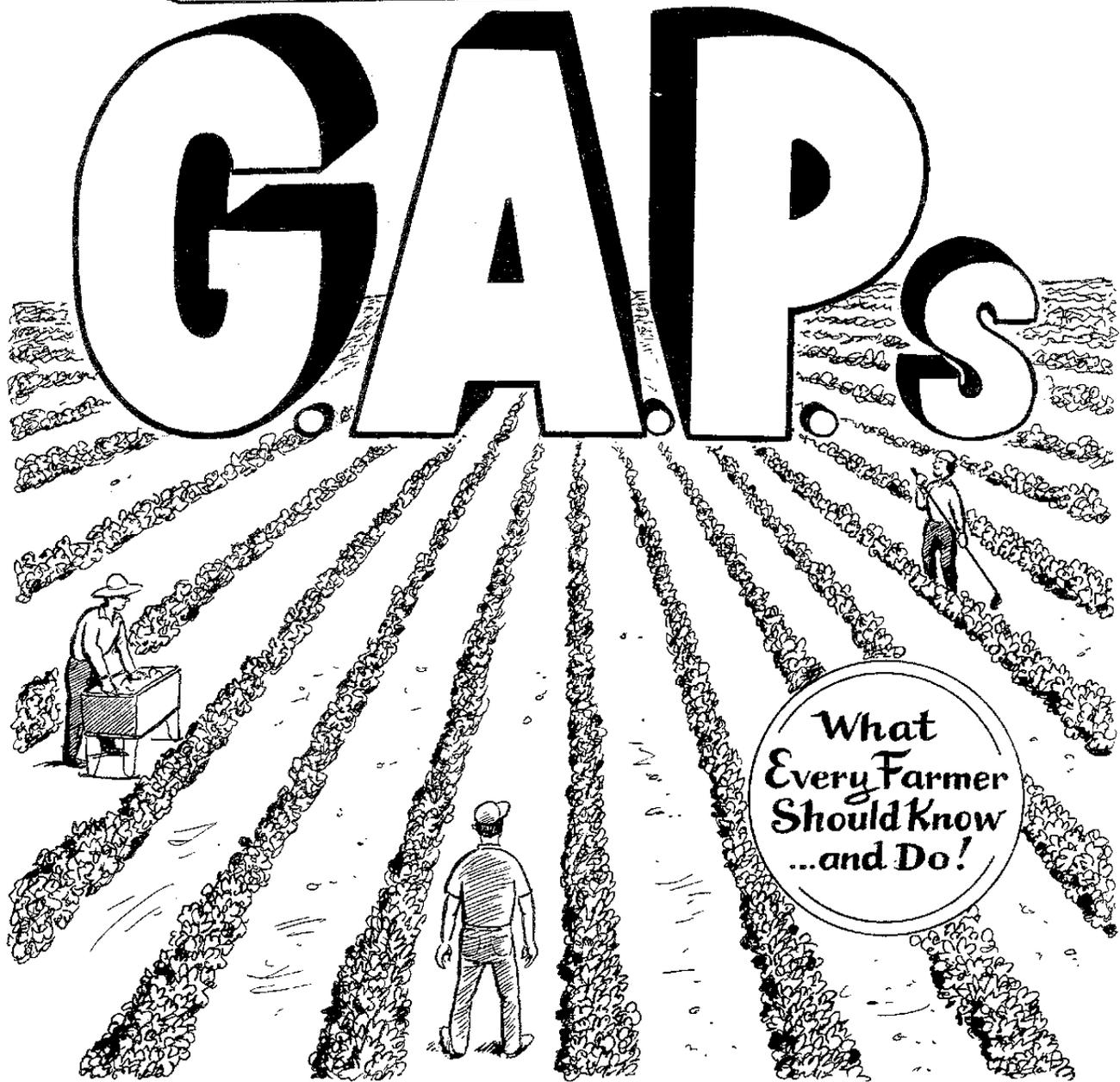
The End





Illustrated Guide to Growing Safe Produce on Your Farm

Good Agricultural Practices



What Every Farmer Should Know ...and Do!

The National Sustainable Agriculture Information Service, ATTRA (www.attra.ncat.org), was developed and is managed by the National Center for Appropriate Technology (NCAT). The project is funded through a cooperative agreement with the United States Department of Agriculture's Rural Business-Cooperative Service. Visit the NCAT website (www.ncat.org/sarc_current.php) for more information on our other sustainable agriculture and energy projects.



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United States Department of Agriculture

National Institute of Food and Agriculture

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The Importance of Food Safety

Farmers play an important role in preventing food-borne illnesses through their use of good agricultural and management practices. There are many ways that farmers can reduce the risk of contamination of their produce, such as:

- The proper use (and disposal) of water,
- Proper compost and application of manure,
- Good hygiene habits from the workers in the farm,
- Regular equipment checkup and maintenance,
- Proper sanitation of processing surfaces and transportation vehicles,
- Accurate record keeping.

With these practices, a farmer is not only contributing to a better and safer food system, but also creating more consumer confidence about the farmer's product and farm while reducing the potential liabilities from a food-borne outbreak.

Pathogens: The Bad Bacteria that Cause Disease

Humans, animals and plants all co-evolved with bacteria that are considered normal, and even necessary, residents of our skin, mucosal membranes, and digestive tract, and, in the case of plants, their roots and leaves. These bacteria are benign inhabitants—they don't cause disease. Pathogens are bacteria that are not normally present in humans, animals or plants, and when they show up, they can cause disease. The good agricultural practices described in this publication were developed to reduce their presence in fresh produce, decreasing the likelihood of disease outbreaks.

The most common bacteria that cause illness are:

Campylobacter

Campylobacter is the most common cause of bacterial food-borne illness. The Centers for Disease Control estimate that 2.4 million persons are affected each year (www.cdc.gov/nczved/divisions/dfbmd/diseases/campylobacter/technical.html). It is commonly found in the intestines of warm-blooded birds and mammals. Food is the most common vehicle for the spread of *Campylobacter*, and produce may be contaminated by animal feces in the fields where raw fruits and vegetables are grown. Most human illness is caused by one species, *Campylobacter jejuni*, and the disease is characterized by symptoms such as diarrhea (often bloody), abdominal cramps, and fever. The illness lasts one week.

Salmonella

Salmonella is a bacterium that causes the disease salmonellosis, with roughly 40,000 cases reported annually in the U.S. These bacteria, which live in the intestinal tract of mammals and birds, are usually transmitted to humans by eating food contaminated with animal feces, including food contaminated by food handlers who didn't use a proper handwashing technique. The disease is characterized by diarrhea (sometimes bloody), fever, and abdominal cramps. *Salmonella* infections can occasionally be localized, or become systemic by entering the blood.

Escherichia coli (E. coli)

E. coli are a large and diverse group of bacteria. Experts think that there might be about 70,000 infections in the U.S. annually with *E. coli* O157, a particularly dangerous "Shiga toxin-producing" *E. coli*, or STEC. STEC live in the guts of ruminant animals, including cattle, goats, sheep, deer, and elk, but have also been found in pigs and chickens. The major source for human illness is cattle. Infection starts when food contaminated with human or animal feces is eaten. *E. coli* most commonly cause diarrhea.

Related ATTRA publications

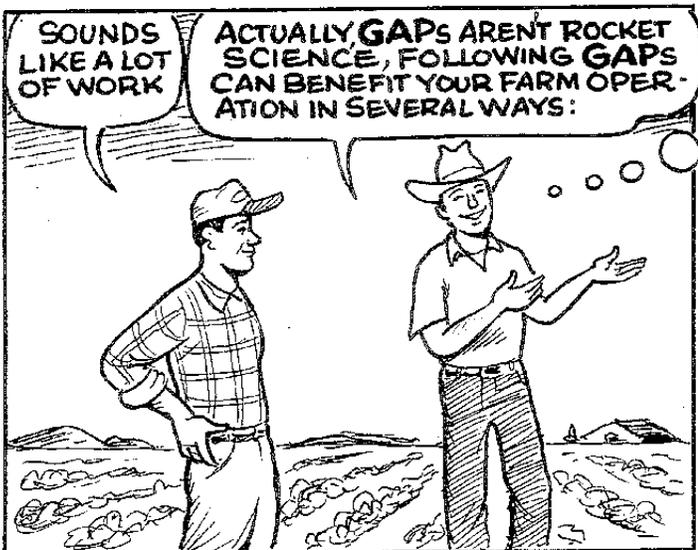
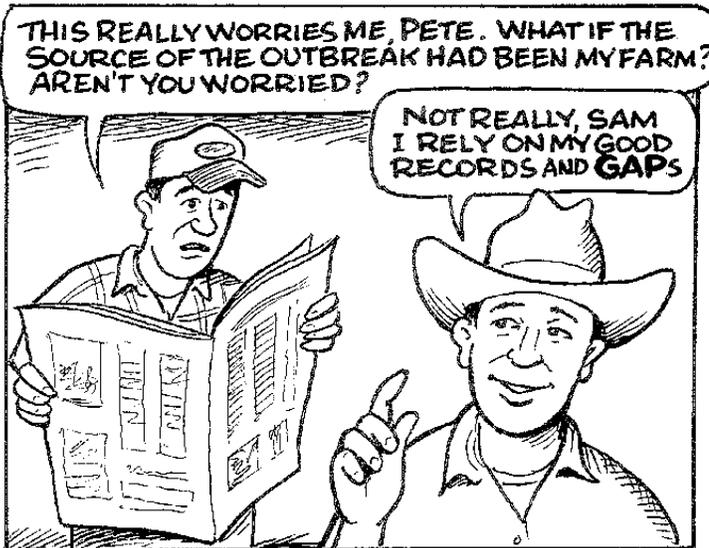
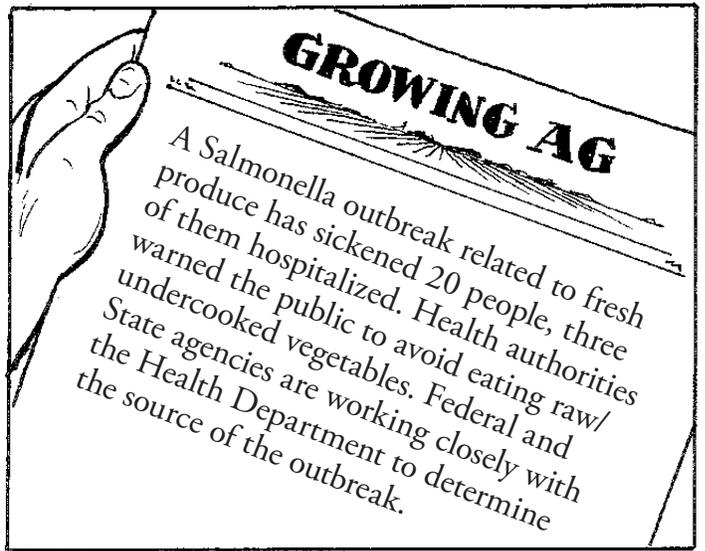
Publications available from ATTRA by phone (1-800-346-9140) or Web (www.attra.ncat.org)

Start a Farm in the City: Has information about urban soils and mitigating contaminated soil.

New Markets for Your Crops: Outlines some approaches to finding new markets, some of which might require a GAPs plan.

Protecting Water Quality on Organic Farms: Overview of practices to support good water quality on your farm.

Farmscaping to Enhance Biological Control: Includes discussion of approaches to developing hedgerows, which can act as buffers to protect crops from contamination.



...AND I HAVE ALL MY GOOD PRACTICES WRITTEN DOWN ON PAPER READY TO SHOW TO ANY FARMERS' MARKET MANAGER OR WHOLESALE BUYER



SOME BENEFITS OF HAVING A GAPS OR FOOD SAFETY PROGRAM FOR YOUR FARM ARE:

- Reduces the risk of produce contamination and contributes to a safer product.
- Allows easier access to markets concerned about food safety issues.
- In case of a food safety issue in your area, good records can prove your safety practices and avoid or reduce liability.

MAYBE I SHOULD HAVE A **GAPS** PLAN

THANKS PETE I'LL SEE YOU TOMORROW

I CAN GIVE YOU A TOUR OF MY FARM TOMORROW SO YOU CAN SEE HOW IT WORKS

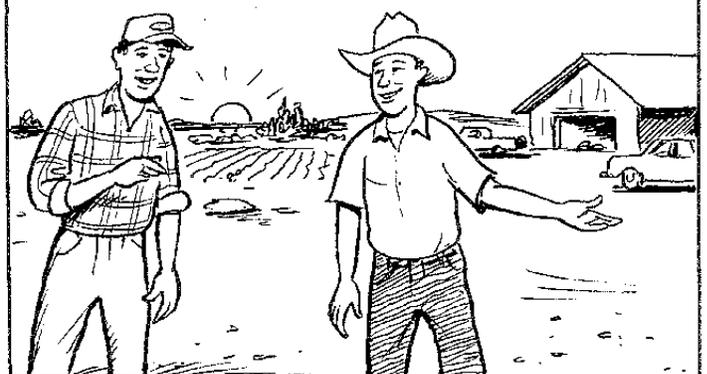


NEXT MORNING SAM VISITS PETE ON HIS FARM

HEY PETE

WHAT'S UP SAM... READY TO SEE HOW WE WORK **GAPS** INTO OUR OPERATION?

SURE



IT'S ALL ABOUT REDUCING THE RISK OF DANGEROUS GERMS THAT CAN CONTAMINATE OUR CROPS



THERE ARE FOUR BASIC APPROACHES TO GAPS:



CLEAN SOIL: Minimize human pathogens in the soil.



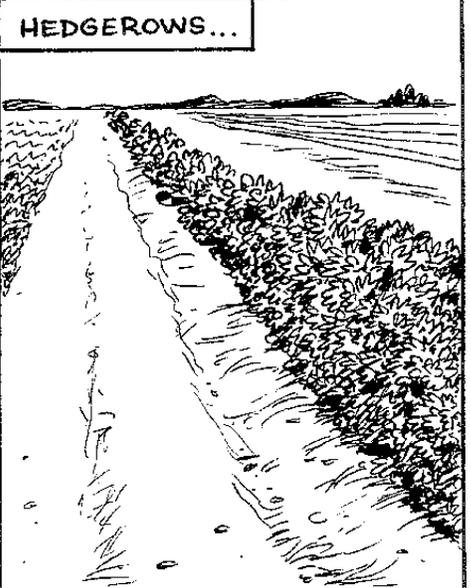
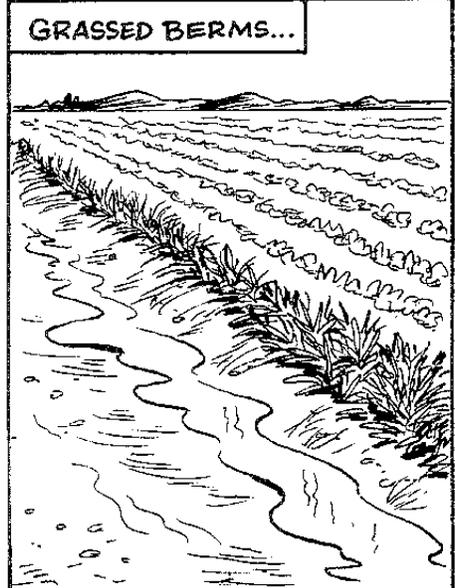
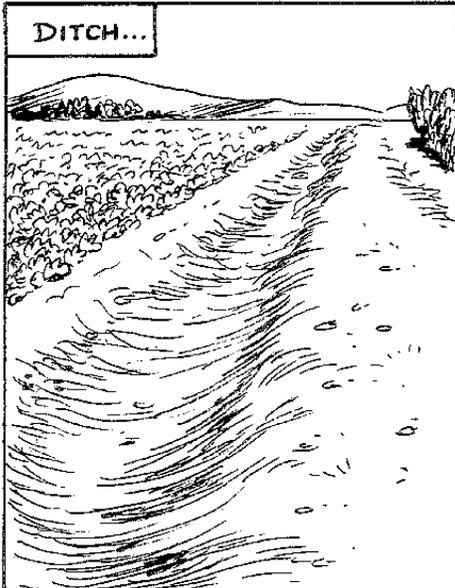
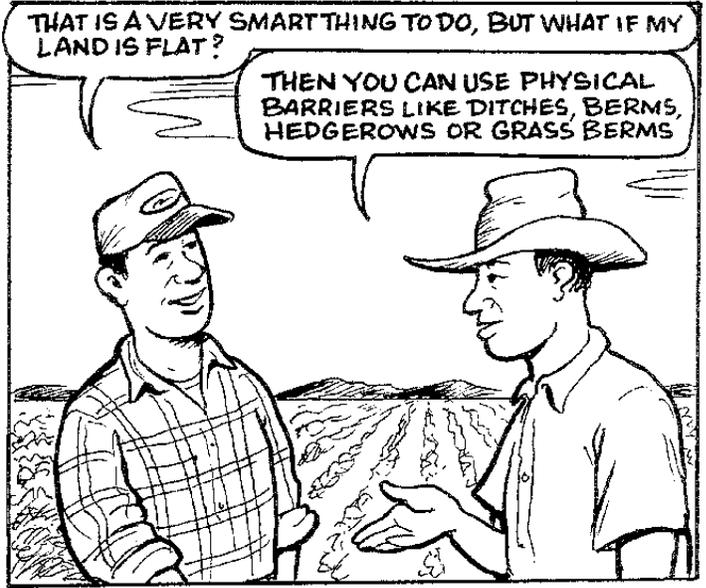
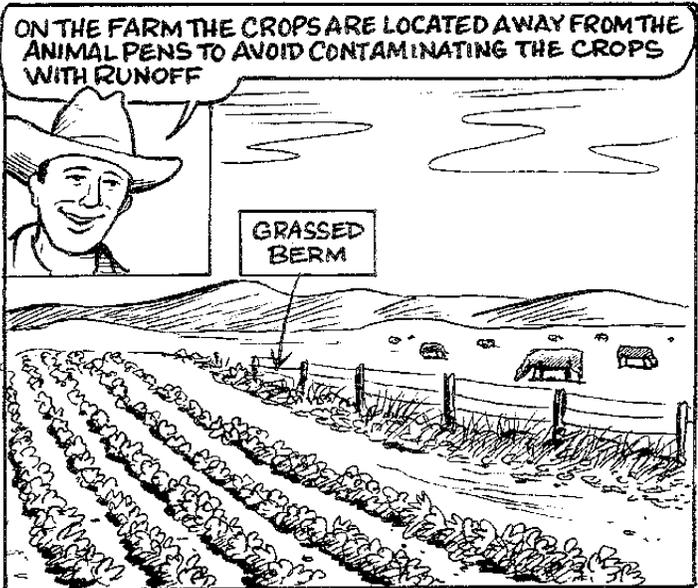
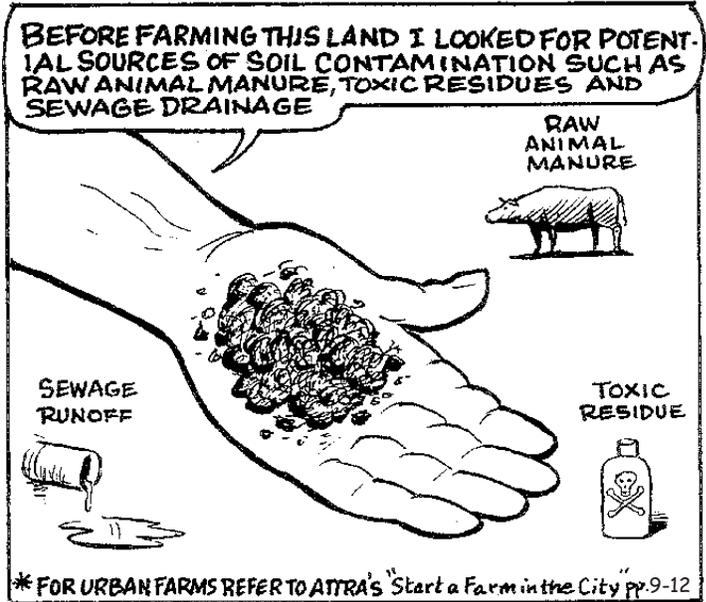
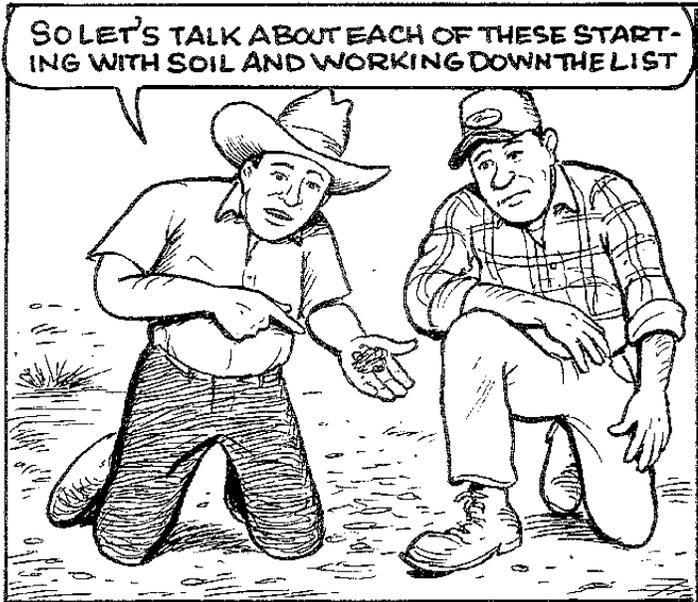
CLEAN WATER: Water quality should match its intended use. For example, water used for washing and processing should be of drinkable quality.



CLEAN HANDS: Workers should use good personal hygiene in the field and in the packing house.



CLEAN SURFACES: Proper washing and sanitation of working surfaces, packing bins, transportation vehicles, etc.



WE USE COMPOST INSTEAD OF FRESH MANURE BECAUSE COMPOST HAS A LOWER RISK OF CARRYING PATHOGENS

PATHOGENS? YOU MEAN DANGEROUS GERMS?

YEAH, THAT'S RIGHT



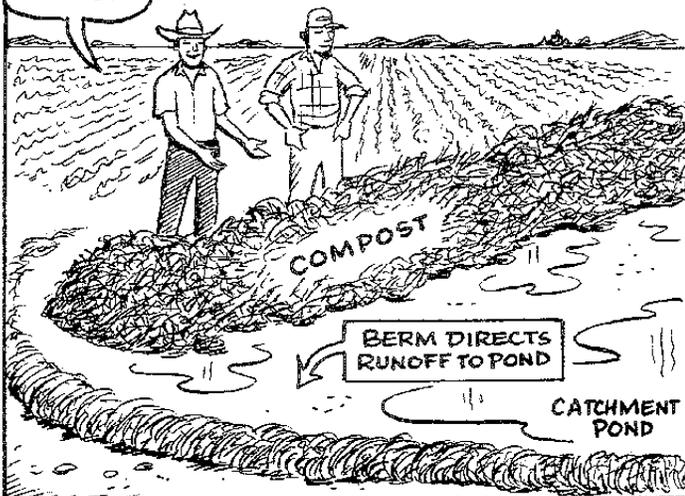
LET ME GO THROUGH THE BASICS:

- The manure composting pile is located a safe distance away from the fields and water sources.
- We store manure in windrows located on a slightly sloped surface.
- We turn the pile regularly to secure aeration and high temperatures within the compost pile.

We maximize the time between manure or compost application and harvest, to minimize risk of contaminating edible parts of the plant.



WE USE BERMS OR CURBS TO CONTROL RUNOFF FROM THE PILE AND DIRECT IT TO A CATCHMENT SYSTEM



COMPOSTING TAKES TIME AND EFFORT. IT'S WORTH IT BECAUSE THERE'S A BIG REDUCTION IN THE PATHOGEN LOAD IF YOU DO IT RIGHT

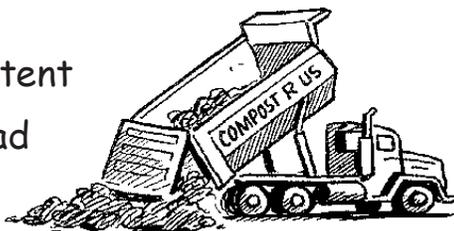
WHAT IF I CAN'T MAKE COMPOST ON MY FARM?



YOU CAN USUALLY BUY COMPOST. WHEN BUYING COMPOST OFF-FARM, IT'S IMPORTANT TO CONSIDER:

Delivery rates
The source of the compost

The nutrient content
The pathogen load



YOU WILL WANT TO ASK FOR A NUTRIENT AND PATHOGEN ANALYSIS FROM YOUR COMPOST SUPPLIER



See page 16 for a list of testing laboratories

MAKE SURE YOU KEEP WRITTEN RECORDS* OF HOW YOU PRODUCE AND APPLY YOUR COMPOST

SO, THESE RECORDS CAN BE IMPORTANT IN CASE OF FOOD SAFETY PROBLEMS?

EXACTLY



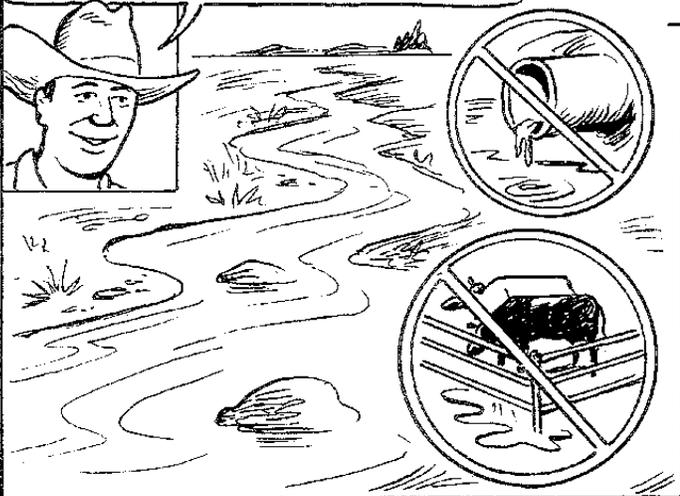
AFTER DISCUSSING SOIL AND COMPOST, PETE MOVES ON TO DISCUSS THE IMPORTANCE OF CLEAN WATER

THIS CREEK IS ONE OF OUR TWO WATER SOURCES. SINCE IT IS SURFACE WATER I USE IT ONLY FOR IRRIGATION AND NOT FOR WASHING PRODUCE OR CLEANING HANDS

IS THAT BECAUSE IT HAS A HIGHER RISK OF BEING CONTAMINATED?



THAT'S RIGHT, SO YOU WANT TO MAKE SURE THERE ARE NO DEAD ANIMALS, MANURE SOURCES OR OTHER STUFF THAT COULD POLLUTE THE CREEK



...AND SPEAKING OF CONTAMINATION, TO REDUCE RISK EVEN MORE I USE DRIP IRRIGATION

With drip there is:

- less contact of water with leaves, stems and fruits,
- efficient use of water,
- easier management of irrigation schedule.

I USE FURROW IRRIGATION ON MY FARM

FURROW IRRIGATION AND HIGH PRESSURE SPRINKLERS ARE MORE LIKELY TO CONTAMINATE EDIBLE PARTS OF THE PLANTS

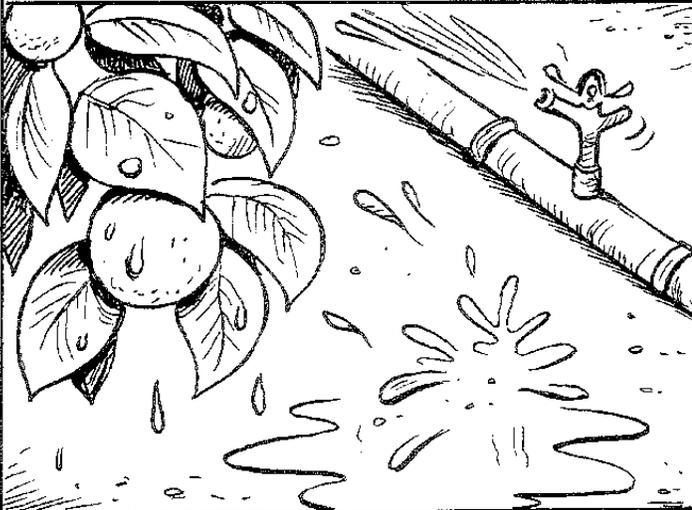


LET ME EXPLAIN: FURROW IRRIGATION WATER CAN COME INTO CONTACT WITH LEAVES AND FRUITS OF THE PLANT



*See page 19 for manure and compost application and production record keeping documents and see page 14 for specific National Organic Program regulations for composted manures

AS FOR HIGH PRESSURE SPRINKLERS, SPRINKLER DROPS SPLASH DIRT ONTO THE LEAVES AND FRUITS.



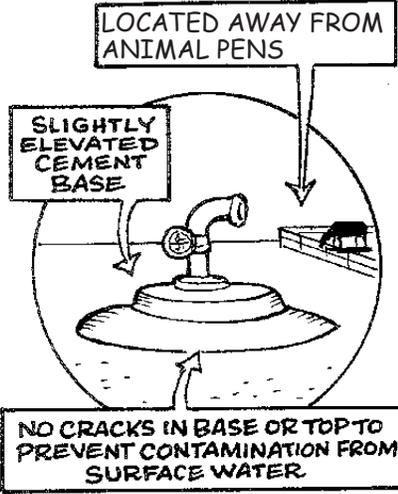
AND FOR ANY FOLIAR SPRAYS, I USE WATER THAT'S SAFE TO DRINK.

WHERE DO YOU GET THAT WATER FROM?

THAT'S A DEEP SUBJECT ~ WE USE WELL WATER



...AND TO MAKE SURE MY WELL WATER IS CLEAN MY WELL IS:



THIS IS ALSO THE WATER MY WORKERS USE TO WASH THEIR HANDS, WHICH BRINGS US TO CLEAN HANDS AND SANITATION



HOW DO YOU GET YOUR WORKERS TO FOLLOW GAPs?

I TRAIN MY WORKERS ABOUT THE IMPORTANCE OF GOOD HYGIENE AND HOW IT RELATES TO FOOD SAFETY



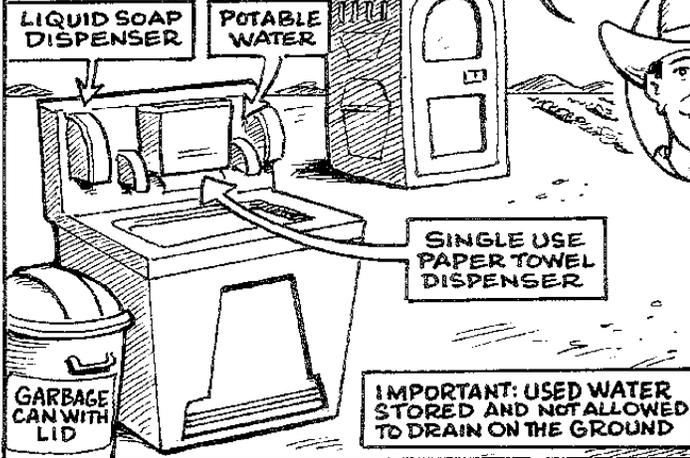
I MAKE SURE EVERYONE UNDERSTANDS IT IS IN THEIR INTEREST TO SUPPORT FOOD SAFETY PRACTICES TO MAINTAIN SALES AND JOBS

IMPORTANT POINTS TO EMPHASIZE AT WORKER FOOD SAFETY WORKSHOPS ARE:

- Make sure workers understand the connection between microbial risks, personal hygiene, food contamination, and how GAPs reduce these risks.
- The importance of reporting illness.
- The importance of simple practices such as keeping produce crates off the soil, and
- Hand washing after toilet use, eating, taking breaks, etc.
- Teach a proper and effective hand washing technique. **

** for a proper hand washing technique, refer to page 11

I ALSO PROVIDE EASY ACCESS FOR ALL MY WORKERS TO CLEAN PORTABLE BATHROOMS AND HANDWASHING STATIONS AND I KEEP RECORDS OF ITS CLEANING SCHEDULE



AND LAST, BUT NOT LEAST: CLEAN SURFACES I HAVE A STANDARD PROCEDURE TO CLEAN AND PROTECT ALL BINS AND HARVEST AID EQUIPMENT



COVER CONTAINERS THAT ARE NOT GOING TO BE USED RIGHT AWAY



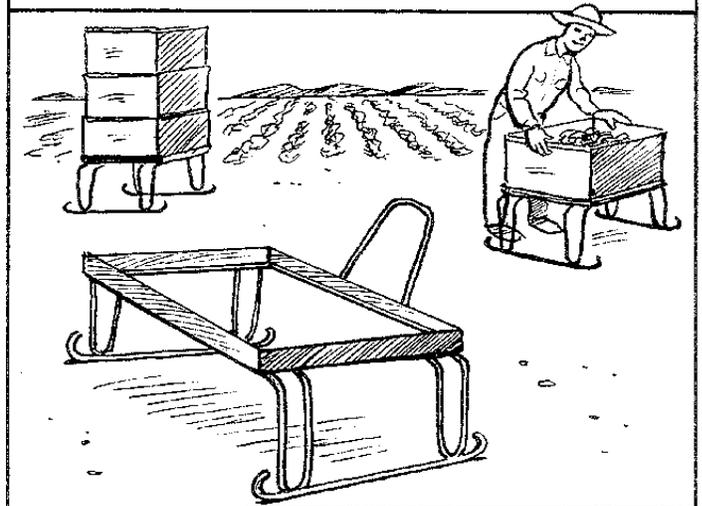
NEVER STAND ON BINS



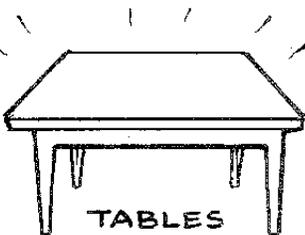
AVOID STACKING CRATES AND CONTAINERS AFTER THEY HAVE BEEN IN CONTACT WITH SOIL



ONE OF MY WORKERS CAME UP WITH A CLEVER SOLUTION: A STAND THAT KEEPS THE HARVEST CRATE FROM COMING INTO CONTACT WITH THE SOIL



OTHER FARM EQUIPMENT THAT IS USUALLY NEGLECTED, BUT SHOULD ALSO BE ROUTINELY CLEANED AND SANITIZED INCLUDES:



INSIDE THE PACKING HOUSE CONSIDER THESE RISK MANAGEMENT PRACTICES:

- The packing facilities and equipment should be clean and sanitized at the end of each day.
- All food scraps, grains, and culls should be removed to avoid attracting pests.
- There should not be any animals or pests present in the packing house.



OUR FARM HAS A DOCUMENTED TRACE BACK PROGRAM WITH I.R.Q. TRACEABILITY STANDARDS IN THE EVENT OF A RECALL

WHAT DOES I.R.Q. MEAN?



THAT MEANS THAT ALL BOXES LEAVING OUR FARM HAVE THE FOLLOWING INFORMATION:

- I = identity of what is inside the box
- R = responsible party: name and address of individual responsible for packing the product.
- Q = quantity: amount in box, weight or count. (also date of harvest).

WE KEEP RECORDS OF OUR LARGE-VOLUME BUYERS, IN CASE WE IDENTIFY CONTAMINATION IN OUR FARM, OUR CUSTOMERS ARE ABLE TO PREVENT ANY FURTHER SPREAD OF AN ILLNESS

AND REMEMBER, AN INTEGRAL PART OF ANY FOOD SAFETY PROGRAM IS DOCUMENTATION OF YOUR GAPS

- Keep up-to-date records for all chemical applications.
- Toilet and hand washing station maintenance records
- Cleaning and sanitizing records
- Worker training
- Injury reports
- Pest control plan and records
- Traceback and system recall

...AND HAVING GUIDELINES AND TRAINING FOR ALL THESE PROCEDURES MAKES IT EASIER FOR EVERYONE, ESPECIALLY NEW WORKERS



THANKS PETE, YOU HAVE GIVEN ME A LOT TO THINK ABOUT

I'M GLAD TO HELP. PUTTING A GAPS PLAN INTO ACTION TAKES SOME TIME AND EFFORT, BUT IT REDUCES YOUR RISK OF FOOD SAFETY PROBLEMS



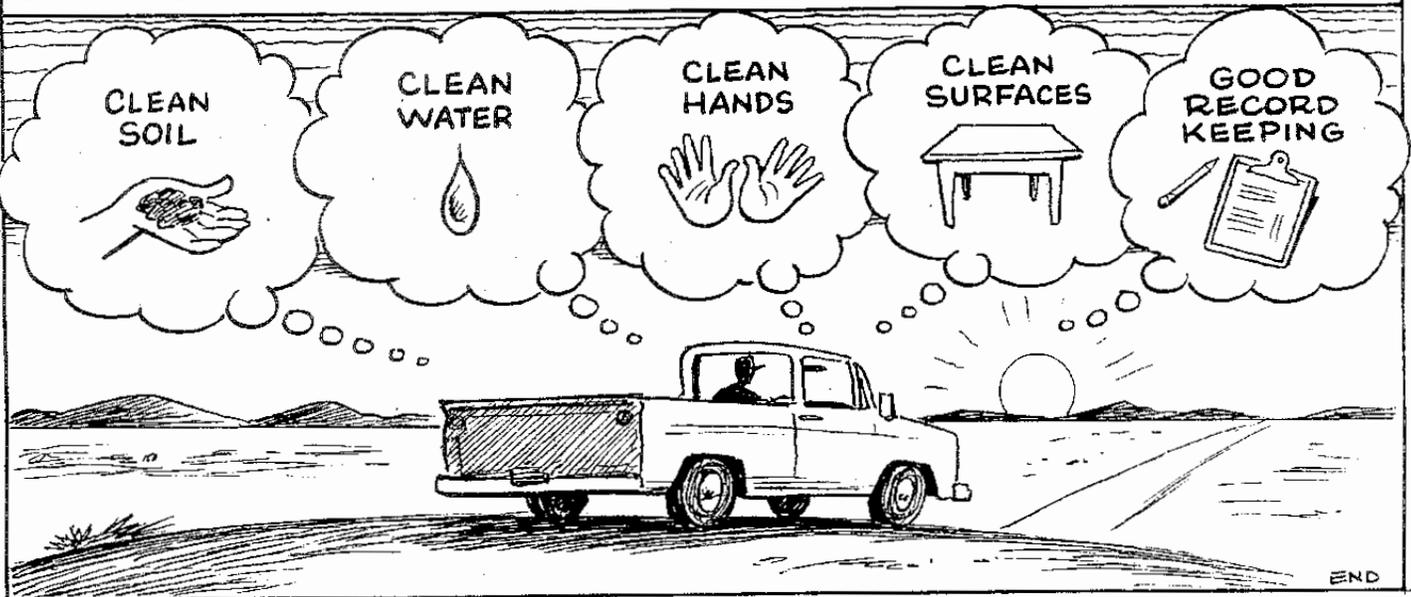
HERE'S A PAMPHLET I GOT FROM ATTRA WITH GOOD RESOURCES AND INFO ABOUT GAPS *

THANKS



* YOU CAN REQUEST A FREE PRINTED COPY OF THIS PAMPHLET BY CALLING ATTRA 1-800-346-9140

SAM LEAVES PETE'S FARM WITH A BUNCH OF GOOD IDEAS TO IMPROVE FOOD SAFETY ON HIS FARM



END

Proper Handwashing Technique

- Wet hands with clean, warm water, apply soap, and work up a lather.
- Rub hands together for at least 20 seconds.
- Clean under the nails and between the fingers.
- Rub fingertips of each hand in suds on palm of opposite hand.
- Rinse under clean, running water.
- Dry hands with a single-use towel.

From *Food Safety Begins on the Farm: A Grower's Guide*.
Cornell University.

Biodiversity and Food Safety on the Farm

Biodiversity is the number and variety of organisms found within a specified geographic location. Biodiversity is important to sustain farm ecosystems because biodiverse soils function better than non-biodiverse soils—they have superior ability to absorb and hold water, are less prone to wind and water erosion, and, through interactions between soil organisms and the plant, biodiverse soils make available a wider range of nutrients to the plant than non-biodiverse soils. A biodiverse farm also retains many checks and balances against outbreaks of pests. Conversely, lack of biodiversity and lack of habitat for beneficial organisms can lead to overuse of pesticides, which is a food safety concern. However, a few species of animals on the farm can present food safety risks if adequate measures are not adopted. The following table lists animal species, the food safety risk they represent to your crops, and actions farmers should take to avoid contamination of produce.

Relative Risk to Unprocessed Produce from Animal Presence		
Domestic Animals	Food Safety Risk	What a Farmer Can Do
Cattle	Very High	<ul style="list-style-type: none"> • Prevent contamination of cropland, and water sources used for crop management, with pasture and rangeland runoff. • Use grasses and vegetable buffers between crops and grazing lands. • Rest grazing areas at least a week prior to irrigation. • Filter runoff through wetlands. • Avoid feeding on confined areas, use healthy pastures. • Use certified compost or make sure farm-made compost is adequately managed. • Use hedgerows or windbreaks to avoid possible dust containing manure blowing into crops.
Non-Domestic Animals	Food Safety Risk	What a Farmer Can Do
Feral pigs	Moderately Low	<ul style="list-style-type: none"> • Monitor fields for feral pig intrusion. Define no-harvest zone if fecal matter is identified. • Hunt the pigs or install hog wire fence. • Removing habitat doesn't work.
Wildlife	Food Safety Risk	What a Farmer Can Do
Deer	Low	<ul style="list-style-type: none"> • Use inexpensive feeding attractants away from crops. • If high deer activity: discourage animals with loud noises, motion sensors, food attractants, and fencing as last resource. • Do not remove habitat that protects water quality.
Rodents	Moderate	<ul style="list-style-type: none"> • Don't grow crops eaten raw near concentrated cow manure.
Field Rodents	Low	<ul style="list-style-type: none"> • Removing habitat that filters pathogens in water is counterproductive.
Birds near cattle operations or polluted areas	Low	<ul style="list-style-type: none"> • Do not plant or at least do not harvest in areas where birds consistently perch directly over planted beds.
Amphibians and reptiles	Low	<ul style="list-style-type: none"> • Make sure that nearby riparian areas are not unnaturally depleted of water during the crop season. Conserve habitat.
Insects	Low	<ul style="list-style-type: none"> • Do not grow crops eaten raw next to areas of concentrated cow manure. • Do not harvest crops impacted by high populations of flies close to harvest.
<p><i>Abstract from Summary Table: Relative Risk to Unprocessed Produce from Animal Presence. Prepared by Wild Farm Alliance. www.wildfarmalliance.org. Obtained from: "Your Farm" Family Farm. Good Agricultural Practices "gaps" and Standard Operating Procedures "sops" Community Alliance with Family Farmers, www.caff.org/policy/GAPsjuly52010.pdf</i></p>		

Resources

Food Safety and Good Agricultural Practices (GAPs)

Several universities and extension services have publications and resources regarding food safety and GAPs. Some of them are listed below:

Iowa State University. University Extension Publications:

On-Farm Food Safety: Guide to Good Agricultural Practices (GAPs)

Learn how to develop a food safety plan on the farm that documents your risk reduction efforts.

<https://www.extension.iastate.edu/store/ListItems.aspx?Keyword=Good%20Agricultural%20Practices>
www.extension.iastate.edu/Publications/PM1974a.pdf

On-Farm Food Safety: Guide to Food Handling

Details of safe food handling habits related to health, hygiene, and handwashing for all farm workers.

<https://www.extension.iastate.edu/store/ListItems.aspx?Keyword=guide%20to%20food%20handling>
www.extension.iastate.edu/Publications/PM1974B.pdf

On-Farm Food Safety: Guide to Cleaning and Sanitizing

Suggested checklists, standard procedures, and schedules to document proper on-farm cleaning and sanitizing practices.

www.extension.iastate.edu/store/ListItems.aspx?Keyword=guide%20to%20cleaning%20and%20sanitizing
www.extension.iastate.edu/Publications/PM1974C.pdf

Cornell University Department of Food Science

Several resources and publications available online.

GAPsNET

Good Agricultural Practices Network for Education and Training. The website shows GAPs-related events provided by the National GAPs Program collaborators.

www.gaps.cornell.edu

Food Safety Begins on the Farm: A Grower's Guide

Good Agricultural Practices for Fruits and Vegetables

<http://sfp.ucdavis.edu/pubs/articles/foodsafetybeginsonthefarm.pdf>

Minimize Pathogen Contamination During Production and Harvest of Fresh Produce

www.wcmorris.com/gap/files/cornell_foodsafe.pdf

National GAPs Educational Materials

www.gaps.cornell.edu/rks.html

Commercial On-Farm Food Safety Practices

New Mexico State University and University of Hawaii, Manoa. Dr Willis Fedio & Jim Hollyer.

This website offers a general view to commercial farmers of the best on-farm food safety practices.

<http://gaps.nmsu.edu/welcome.html>

If you need more information about this website and its content, please e-mail:

Dr Willis Fedio Ph.D.,
Microbiologist
New Mexico State University, Physical Science Laboratory,
wfedio@psl.nmsu.edu

Jim Hollyer,
University of Hawaii,
hollyer@hawaii.edu

There is also a 25 min. DVD video available titled *Closing the GAPs: Utilizing Good Agricultural Practices* that demonstrates the Good Agricultural Practices.

Cost: only shipping and handling fees apply
To order or for more information please contact:

College of Agricultural and Home Economics
Box 30003, MSC 3AI
New Mexico State University
Las Cruces, NM 88003-8003

Or call:

575-646-5368 or toll free: 1-888-750-4156
vstudio@nmsu.edu

The Joint Institute for Food Safety and Applied Nutrition (JIFSAN) has a Good Agricultural Practices manual available online for free at:

www.jifsan.umd.edu/training/gaps_manual.php

The U.S. Food and Drug Administration (FDA) has a variety of guidance documents online regarding food.

Guidance for Industry: Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables.

October 26, 1998.

This U.S. Food and Drug Administration (FDA) guide provides assistance to U.S. and foreign produce industry in enhancing the safety of domestic and imported produce by addressing common areas of concern in growing, harvesting, sorting, packing, and distribution of fresh produce.

Available online at: www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm064574.htm

Contact information:

Office of Food and Safety,
U.S. Food and Drug Administration,
5100 Paint Branch Parkway
College Park, MD 20740
301-436-1700

Also, the FDA offers specific documents on crops:

Guides to Minimize Microbial Food Safety Hazards of:

Leafy Greens: <http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm174200.htm>

Melons: <http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm174171.htm>

Tomatoes: <http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm173902.htm>

The New Crops Opportunity Center, from the University of Kentucky Department of Agriculture, provides production and marketing information on new crops and value added versions of current crops. They have a good introductory publication about Good Agricultural Practices: www.uky.edu/Ag/NewCrops/introsheets/gap.pdf

For more information, contact:

Christy Cassidy

Coordinator, New Crop Opportunity Center

N-318 Agricultural Science Center

University of Kentucky

Lexington, KY 40546-0091

859-257-1477

newcrops@uky.edu

Farm Food Safety. On-farm Food Safety from Penn State University. The web page shows you a four-step process to safer farm practices, with different resources from publications, training material and videos. There is also information on training and workshops.

<http://foodsafety.psu.edu/gaps>

Rhode Island Food Safety Education. URI Cooperative Extension. Includes information on Rhode Island's Good Agricultural Practices Grower Certification Program.

www.uri.edu/ce/ceec/food/grow.html

Kentucky Department of Agriculture: Good Agricultural Practices Educational Resources. A variety of resources from different sources can be found in this website regarding self audits, third party audits, general information, good agricultural practices, microbial contamination, training manuals for farm workers, and also product specific publications (tomatoes, peaches, lemons, etc.) Available on the Web at:

www.kyagr.com/marketing/GAPResources.htm

North Carolina Market Ready. Fresh Produce Safety. NC Cooperative Extension Fresh Produce Safety – Field to Family is one of the core educational focus areas of NC Market Ready program. Developed for NC Cooperative Extension personnel and NC growers and consumers, the

Fresh Produce Safety portal, contains valuable resources and materials, including information on Good Agricultural Practices (GAPs), traceability, training materials, cost share opportunities and more. Visit this portal at: www.ncsu.edu/enterprises/ncfreshproducesafety.

National Good Food Network

The National Good Food Network is bringing together people from all parts of the rapidly emerging good food system – producers, buyers, distributors, advocates, investors and funders – to create a community dedicated to scaling up good food sourcing and access. The webpage has a variety of resources including publications, news and webinars.

www.ngfn.org

Ready for an Audit?

The retail and food service industries are implementing the fresh produce audit verification program in order to verify that farms are producing fruits and vegetables in the safest possible way. These audits are performed by third parties to verify that specific good agricultural practices are being followed.

The Agricultural Marketing Service, together with state departments of agriculture, offers a program based on voluntary audits that confirms adherence to the recommendations made in the Food and Drug Administration's *Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables*. If you are interested in this program, please contact:

Kenneth S. Petersen

Audit Programs Coordinator

Fresh Products Branch

1400 Independence Avenue SW

Room 1661, Stop 0240

Washington, DC 20250-0240

Phone: 202-720-4560

FAX: 202-720-8871

ken.petersen@usda.gov

Steve Thomas

California Department of Food and Agriculture

Program Supervisor

CA Fed-State Inspection Service

165 East Tulare

Dinuba, CA 93618

Phone: 559-595-8000

sthomas@cdfa.ca.gov

There are also self audits available on the Internet:

UC Good Agricultural Practices offers GAP self audits which allow you to assess the GAPs in use in your business. You can answer the self audit online or print the self audit for your use. The complete document is available for download.

http://groups.ucanr.org/UC_GAPs/GAP_Self-Audits

Penn State GAP Self Audit. This Food Safety self audit is based on the USDA Good Agricultural Practices and Good Handling Practices Verification Program Audit Matrix. http://foodsafety.psu.edu/gaps/Checklist_with_Points2.pdf

Grading, Certification and Verification. The Agricultural Marketing Service (USDA) offers a listing of participating companies that perform third-party audits for the retail and food service industry to verify that their suppliers are in conformance to specific agricultural best practices. www.ams.usda.gov/AMSV1.0/ams.fetchTemplateData.do?template=TemplateN&page=GAPGHPAuditVerificationProgram

The Kentucky Department of Agriculture lists in its website self-audit resources (from Cornell University) as well as third-party audit resources. www.kyagr.com/marketing/GAPResources.htm

The NC Market Ready program also has audits available (self audits and third-party audits) and food safety plans essential to obtain GAPs certification. http://ncsu.edu/enterprises/mcfreshproducesafety/?page_id=2347

What will you do if a food-borne illness is suspected to come from your farm?

The best way to protect yourself is to have proper documentation. A personal food safety manual for your farm is like “insurance” that shows the application of good practices. The **University of Massachusetts Extension** has a Good Agricultural Practices Food Safety Manual available online for free that can be used as a template for your farm. The manual is available at: www.umassextension.org/nutrition/index.php/programs/food-safety/programs/good-agricultural-practices/gap-manual

For more information on GAPs and help in setting up a Food Safety Plan at your farm, contact:

David Nyachuba
dgn@nutrition.umass.edu
413-545-0552

or
Rich Bonanno
rbonanno@umext.umass.edu
978-361-5650

The **Kentucky Department of Agriculture** also has a compilation of farm manuals available from different resources to download or click from their website: www.kyagr.com/marketing/GAPResources.htm

Fresh Produce Safety Plan for Field Practices (NC Market Ready). Consumers and retailers are demanding accountability when it comes to producing, buying and selling fresh produce. Developing, implementing and auditing a

food safety plan are essential steps in obtaining Good Agricultural Practices (GAPs) certification. NC Market Ready has a compilation of resources useful in this area: http://ncsu.edu/enterprises/mcfreshproducesafety/?page_id=2383

Specific NOP regulations for composted manures:

Policy

“Processed manure may be used as a supplement to a soil building program without a specific interval between application and harvest. As always, producers are expected to comply with all applicable requirements of the NOP regulations with respect to soil quality, including ensuring the soil is enhanced and maintained through proper stewardship.

Processed manure products must be treated so that all portions of the product, without causing combustion, reach a minimum temperature of either 150° F (66° C) for at least one hour or 165° F (74° C), and are dried to a maximum moisture level of 12%; or an equivalent heating and drying process could be used. In determining the acceptability of an equivalent process, processed manure products should not contain more than 1×10^3 (1,000) MPN (Most Probable Number) fecal coliform per gram of processed manure sampled and not contain more than 3 MPN Salmonella per 4 gram sample of processed manure.”

The NOP document master list is available on the Web at: www.ams.usda.gov/nop/NoticesPolicies/MasterList.html

And specific regulations for processed animal manures: www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELPRDC5062127

Soil and Compost:

ATTRA Publications

All these publications are available online on our ATTRA website: <http://attra.ncat.org> or by calling and requesting a free copy at: 800-346-9140.

Alternative Soil Testing Laboratories

This resource list provides a range of soil testing labs and supplies that support the special analytical needs of farmers using organic or sustainable production methods. <http://attra.ncat.org/attra-pub/summaries/summary.php?pub=285>

Biodynamic Farming and Compost Preparation

Biodynamic agriculture was the first ecological farming system to arise in response to commercial fertilizers and specialized agriculture after the turn of the century, yet it remains largely unknown to the modern farmer and land-grant university system. The contribution of biodynamics to organic

agriculture is significant, however, and warrants more attention. This publication provides an overview of biodynamic farming and includes additional details and resources on the specialized practice of biodynamic composting.

<http://attra.ncat.org/attra-pub/summaries/summary.php?pub=290>

Farm Scale Composting Resource List

This resource list offers readings, links, associations, software, periodicals and bibliographies on composting at an individual farm scale.

<http://attra.ncat.org/attra-pub/summaries/summary.php?pub=287>

Manures for Organic Crop Production

Livestock manures are an important resource for sustainable and organic vegetable crop production. This publication discusses the problems and challenges associated with using both raw and composted manures and some of the solutions. Because it is a similar material with related concerns, guano is also dealt with in this document. Restrictions on the use of raw manure in organic farming are also discussed.

<http://attra.ncat.org/attra-pub/summaries/summary.php?pub=182>

Notes on Compost Teas

This publication offers a brief discussion of compost teas compared with compost extracts, describes some methods and equipment for compost tea production, and introduces the soil foodweb concept. A list of laboratories that analyze compost tea is provided, along with an annotated list of key literature and links to resources on the Web.

<http://attra.ncat.org/attra-pub/summaries/summary.php?pub=125>

Soil Management: National Organic Program Regulations

The National Organic Program Rule, §205.203, Soil Fertility and Crop Nutrient Management Practice Standard, does not define specific land practices that producers must use. But it does identify general soil management and environmental protection objectives. From these objectives, producers and the organic certifiers they work with must determine whether specific farming practices meet the NOP criteria. This publication provides management guidelines for meeting, and measurable parameters for monitoring, these objectives. It also discusses why these objectives are essential for maintaining sustainable, organic production systems.

<http://attra.ncat.org/attra-pub/summaries/summary.php?pub=180>

Other Soil and Compost Resources

BioCycle: Journal of Composting and Organics Recycling

Advancing composting, organics recycling, and renewable energy.

Available online at: www.jgpress.com/biocyclus.htm

Compost Science and Utilization

An online site with different resources for composting science and use.

www.jgpress.com/compostscience/index.html

Composting at Home

A factsheet from the Ohio State University Extension. Available online at: <http://ohioline.osu.edu/com-fact/0001.html>

Cornell Composting

This website is maintained by the Cornell Waste Management Institute and provides access to a variety of composting educational materials and programs developed at Cornell University.

<http://compost.css.cornell.edu/index.html>

Also available, the On-Farm Composting Handbook: http://compost.css.cornell.edu/OnFarmHandbook/onfarm_TOC.html

Farmer Information Fact Sheets: Composting

A set of simple procedures for making compost on the land, from grass cuttings and using water hyacinth.

<http://lecoport.org/perl/lecoport15.pl?SearchType=slideshowView&slideshowId=92&checkRequired=Y>

US Composting Council (USCC)

The USCC is a national, nonprofit trade and professional organization promoting the recycling of organic materials through composting. The USCC is the only national organization committed to the advancement of the composting industry.

www.compostingcouncil.org

Agricultural Composting Basics

From the Ministry of Agriculture, Food and Rural Affairs, Ontario. A very comprehensive factsheet available online at: www.omafra.gov.on.ca/english/engineer/facts/05-023.htm#site

eXtension

An interactive learning environment with diverse publications on topics such as agriculture. They have a search engine to locate Extension offices near you. A good article on manure and compost utilization is available online:

Manure and Compost Utilization on Fruit and Vegetable Crops

www.extension.org/pages/Manure_and_Compost_Utilization_on_Fruit_and_Vegetable_Crops

Also, **Making and Using Compost in Organic Agriculture**
www.extension.org/article/18567

Water and Irrigation:

ATTRA Publications

All these publications are available online at our ATTRA website: <http://attra.ncat.org> or by calling and requesting a free copy at 800-346-9140.

Energy Saving Tips for Irrigators

This publication describes ways that irrigators can save energy to reduce irrigation costs. It describes recommended irrigation system installations, explains how utilities charge their irrigation customers for electricity, and describes common causes of wasted energy, as well as common energy-saving hardware improvements. It also includes a do-it-yourself method to estimate the efficiency of electrically powered irrigation systems. A listing of references and resources follows the narrative.

<http://attra.ncat.org/attra-pub/summaries/summary.php?pub=119>

Maintaining Irrigation Pumps, Motors, and Engines

This publication explains how to maintain irrigation pumps, motors, and engines for peak efficiency. The publication includes descriptions and diagrams of recommended installations, checklists for maintenance tasks, and a troubleshooting guide. Each system component is treated separately and maintenance tasks are broken down by how frequently they need to be done.

<http://attra.ncat.org/attra-pub/summaries/summary.php?pub=112>

Measuring and Conserving Irrigation Water

This publication describes how to find the net water application rate for any irrigation system. It further explains how to calculate the number of hours the system should be operated, describes several ways to measure flowing water in an open channel or pipeline, and offers suggestions for irrigating with limited water supplies.

<http://attra.ncat.org/attra-pub/summaries/summary.php?pub=332>

Protecting Water Quality on Organic Farms

While organic farms tend to have less nitrogen leaching, better nutrient holding ability, and less runoff and erosion, there can still be environmental concerns related to organic farming, in the areas of the transition period from conventional to organic, in nutrient management planning practices and from improper storage of manure or compost materials. This publication discusses strategies for preventing water pollution by addressing those concerns.

<http://attra.ncat.org/attra-pub/summaries/summary.php?pub=114>

Irrigation (Power Point presentation)

Sustainable irrigation practices and methods for protecting soil and water quality when using irrigation

http://attra.ncat.org/downloads/water_quality/irrigation.pdf

Other Water and Irrigation Resources

National Institute of Food and Agriculture: Water

American communities and rural areas depend on a safe and reliable water supply. The science and management of water requires consideration of the quantity and quality of water resources and the land management activities that affect these water resources. Through research, education and extension, NIFA water programs provide basic knowledge, application and learning opportunities needed to address agricultural water quality and quantity issues.

www.csrees.usda.gov/water.cfm

Water: Laws, Regulations, Policy, Guidance and Legislation. US EPA

Laws and regulations, policy and Guidance documents, and legislation, US EPA Department of Water.

www.epa.gov/OW/laws.html

NRCS Water Quality and Water Quantity

The NRCS West National Technology Support Center hosts a team of technical specialists that cover a broad range of water quality and quantity issues. Each of nine disciplines provides information, data, software, and support contacts.

www.wsi.nrcs.usda.gov/products/W2Q/W2Q_home.html

The Farm Water Quality Planning Program is a coordinated effort by the University of California Division of Agriculture and Natural Resources, whose goal is to improve water quality education to the irrigated agriculture industry in California.

<http://groups.ucanr.org/signup/index.cfm>

The National Water Program has the mission of creating and disseminating knowledge that insures a safe and reliable source of water of the appropriate quality to meet the needs of food and fiber production, human health, use and economic growth, maintenance and protection of natural environmental systems.

www.usawaterquality.org

Disinfecting a Domestic Well with Shock Chlorination

This New Mexico State University publication talks about shock chlorination as a disinfection treatment recommended when a domestic drinking water system is contaminated with bacteria. Contamination can occur when the well is installed.

http://aces.nmsu.edu/pubs/_m/m-115.pdf

Analytical and Testing Services

Alternative Soil Testing Laboratories

This resource from ATTRA provides a range of soil testing laboratories and supplies that support the special analytical needs of farmers using organic or sustainable production methods.

<http://attra.ncat.org/attra-pub/summaries/summary.php?pub=285>

The US Composting Council lists a group of STA (Soil Testing Assurance) labs that provide analytical services for STA participants and use TMECC (Test Methods for Evaluation of Compost and Composting).

www.compostingcouncil.org/programs/stallabs.php

Other Agricultural Analytical Laboratories by region:

North Central Region

(Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin)

Universal Analytical Laboratories

891 Eighth Street
Carlyle, IL 62231
Phone: 618-594-2627
Fax: 618-594-2637
ualab@ualab.com

GMS Laboratories

They perform soil tests, including heavy metals, and compost. Different tests available. Contact information:

P.O. Box 61
23877 E 00 North Road
Cropsey, IL 61731
Phone: 309-377-2851
Fax: 309-377-2017
gmslab83@gmslab.com
www.gmslab/pages/home

Olsen's Agricultural Laboratory

210 East 1st Street
McCook, NE 69001
Phone: 308-345-3670
Fax: 308-345-7880
www.olsenlab.com/default.aspx

Northeast region

(Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Washington D.C., West Virginia)

Agricultural Analytical Services Lab

Wide range of services including soil (heavy metals), manure and compost, water, plant tissue, and others. Contact information:

Penn State University
Tower Rd.
University Park, PA 16802
Phone: 814-863-0841
Fax: 814-863-4540
aaaslab@psu.edu
www.aaaslab.psu.edu

UVM Agricultural and Soil Testing Laboratories

Provides soil (including heavy metals), manure and compost testing. Contact information:

Agricultural and Environmental Testing Lab
Jeffords Hall, Room 262
63 Carrigan Drive
University of Vermont
Burlington, VT 05405-1737
Phone: 802-656-3030
Fax: 802-656-0285
Joel.Tilley@uvm.edu / dross@uvm.edu
www.uvm.edu/pss/ag_testing

Analytical Laboratory and Maine Soil Testing Service

5722 Deering Hall
Orono, ME 04469-5722
Phone: 207-581-3591
Fax: 207-581-3597
<http://lanlab.umesci.maine.edu>

South Region

(Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, Puerto Rico, US Virgin Islands)

Waters Agricultural Laboratories Inc.

Soil analysis (including heavy metals), water analysis and other services relevant to agriculture. Located in Georgia and Kentucky. Contact information:

257 Newton Rd.
P.O. Box 382
Camilla, GA 31713
or
2101 Calhoun Rd.
Highway 81
Owensboro, KY 42301
Phone: 229-336-7213
Fax: 229-336-7967
info@watersag.com
www.watersag.com/frame.htm

Soil, Water and Forage Analytical Laboratory

045 Agricultural Hall
Stillwater, OK 74078
Phone: 405-744-6630
Fax: 405-744-9575
soiltesting@okstate.edu
www.soiltesting.okstate.edu/index.htm

A&L Eastern Laboratories, Inc.

7621 Whitepine Rd.
Richmond, VA 23237
Phone: 804-743-9401
Fax: 804-271-6446
office@al-labs-eastern.com
<http://al-labs-eastern.com/index.html>

A&L Plains Laboratories

A&L Plains Agricultural Laboratory
Lubbock, TX 79408-1590
Phone: 806-763-4278
Fax: 806-763-2762
www.al-labs-plains.com

West Region

(Alaska, Washington, Oregon, California, Hawaii, Montana, Idaho, Nevada, Utah, Arizona, Wyoming, Colorado, New Mexico)

D&D Agricultural Laboratory, Inc.

Specializing in soil, plant and water analysis
Contact information:
5750 E. Shields Ave., Suite 104
Fresno, CA 93727
Phone: 559-348-1818

Dellavalle Laboratory, Inc.

Provide soil, water, plant tissue, manure analysis, with others. Also consultant services. Contact information:
1910 W. McKinley Ave., Suite #110
Fresno, CA 93728
Phone: 800-228-9896 / 559-233-6129
www.dellavallelab.com/index.html

Waterlab Corp

2603 12th Street SE
Salem, OR 97302
Phone: 503-363-0473
Fax: 503-363-8900
<http://waterlabcorp.com/index.php>

Other Useful Resources:

The United States Environmental Protection Agency (EPA) helps you find environmental information about the area where you live, regarding possible contamination in water, soil and air. The website is: www.epa.gov/epahome/wherelive.htm. The EPA also offers a list of environmental agencies by state: www.epa.gov/epahome/state.htm

The EPA has a very complete and informative Web page on compost: www.epa.gov/epawaste/conserve/rrr/composting/index.htm

Keeping Feces on the Farm. Science Now.

This article reveals the advantage of spray irrigation compared to older flood irrigation techniques. Spray irrigation appears to reduce transport of pathogens into drinking water wells. This is especially a concern for livestock farming operations, which are increasingly worried about liability from *E. coli* and similar cases of infection.
<http://news.sciencemag.org/sciencenow/2010/06/keeping-feces-on-the-farm.html>

Best On-Farm Food Safety Practices: Documenting Trace-Back and Trace-Forward of Harvested Produce

Helpful publication from the College of Tropical Agriculture and Human Resources, University of Manoa at Hawaii. This document gives a good description of a traceback system, mostly oriented for a larger farm, but the principles are the same. www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-36.pdf

Sample Record Keeping Form for Compost/Manure Application and for Compost Production

Manure Applications log

From: *National GAPs Education Materials, Cornell University Department of Food Science:*
www.gaps.cornell.edu/rks.html

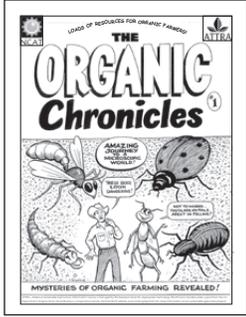
Name of operation:							
Please see the food safety plan for overall manure application procedures							
Date	Field Applied	Rate	Incorporated (Yes or No)	Supplier	Crop Planted (Type and Date)	Crop Harvested (Date)	Initials
Reviewed By:					Title:		
Date:							

Compost Production Record

From: *Organic Market Farm Documentation Series. ATTRA.* <http://attra.ncat.org/attra-pub/PDF/marketforms.pdf>

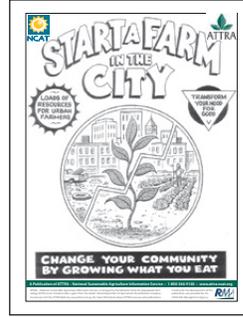
Compost Production Record		
A record of on-farm compost production practices.		
Farm Name:		Production Year:
Compost Pile, Windrow, or Unit I.D.:		Date Started:
Compost Production Method Used (circle one): windrow in-vessel static aerated pile		
Feedstocks Used (including inoculants): (see other side for approximate C:N ratios of common feedstocks)		Estimated C/N Ratio:
Dates	Temperature	Turned?

Other publications in ATTRA's Illustrated Series of publications



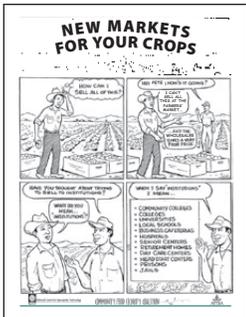
The Organic Chronicles

- Available in English, Hmong, and Spanish



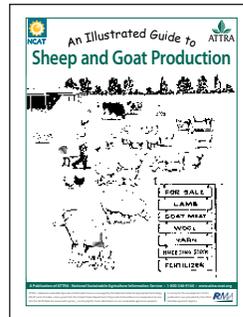
Start a Farm in the City

- Available in English and Spanish



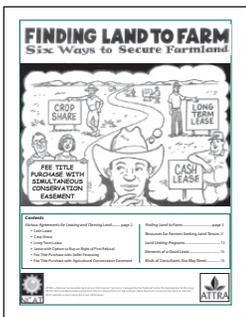
New Markets for Your Crops

- Available in English and Spanish, and as an audio download in Spanish



Illustrated Guide to Sheep and Goat Production

- Available in English, Hmong, and Spanish



Finding Land to Farm

- Available in English and Spanish



Organic IPM Field Guide

- Available in English and Spanish

Illustrated Guide to Growing Safe Produce on Your Farm: GAPS

By Pamela Wolfe and Rex Dufour
 NCAT Agriculture Specialists
 © 2010 NCAT

Robert Armstrong, Illustrations
 Karen Van Epen, Editor
 Robyn Metzger, Production

This publication is available on the Web at:
www.attra.ncat.org/attra-pub/PDF/foodsafety.pdf

IP382
 Slot 379
 Version 011911

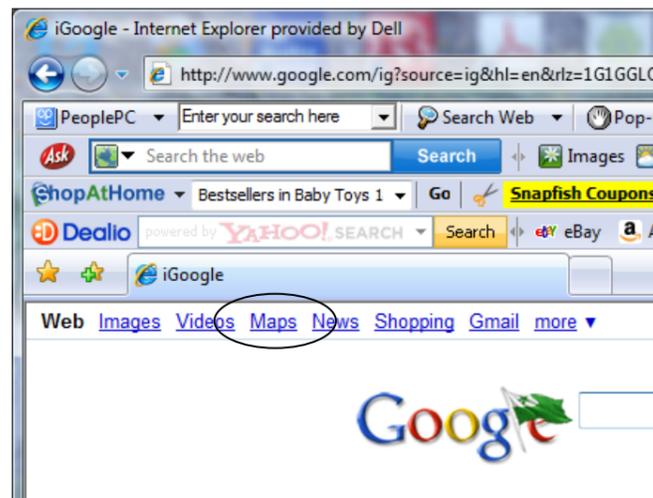
Creating a Field Map with Google Maps

An accurate map of your farm is a foundation piece in your GAP manual. Without a clearly drawn map with your fields delineated, it will be difficult for you to prove to your auditors that you can provide a full traceback of your farm's products. In addition, you may be able to see potential risks in the aerial view of the farm that you might not have noticed before.

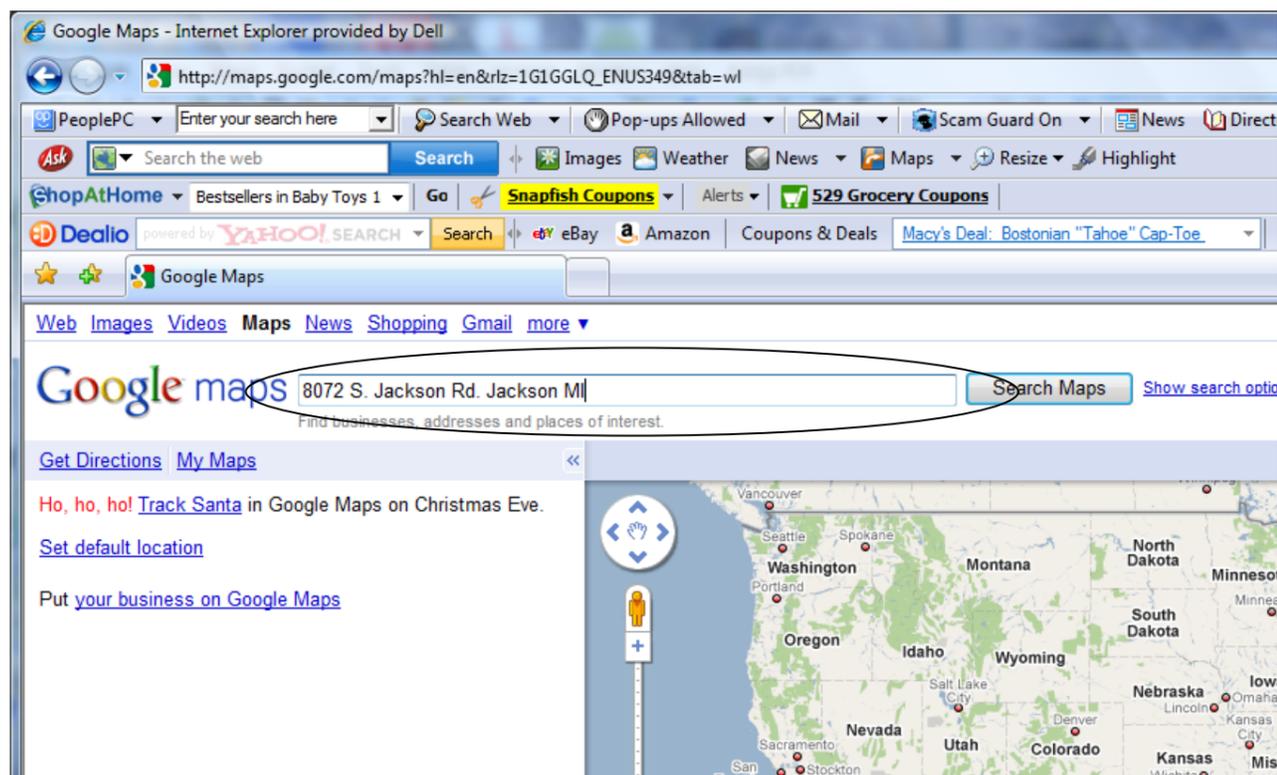
Your field map should contain the name, address and contact information of your farm as well as the fields outlined and labeled with the current year's crop. If you put together a field map in Microsoft Word, updating information from year to year is easy.

Using a Google Map picture as a base for your Field map is pretty straightforward. The steps are outlined for you below.

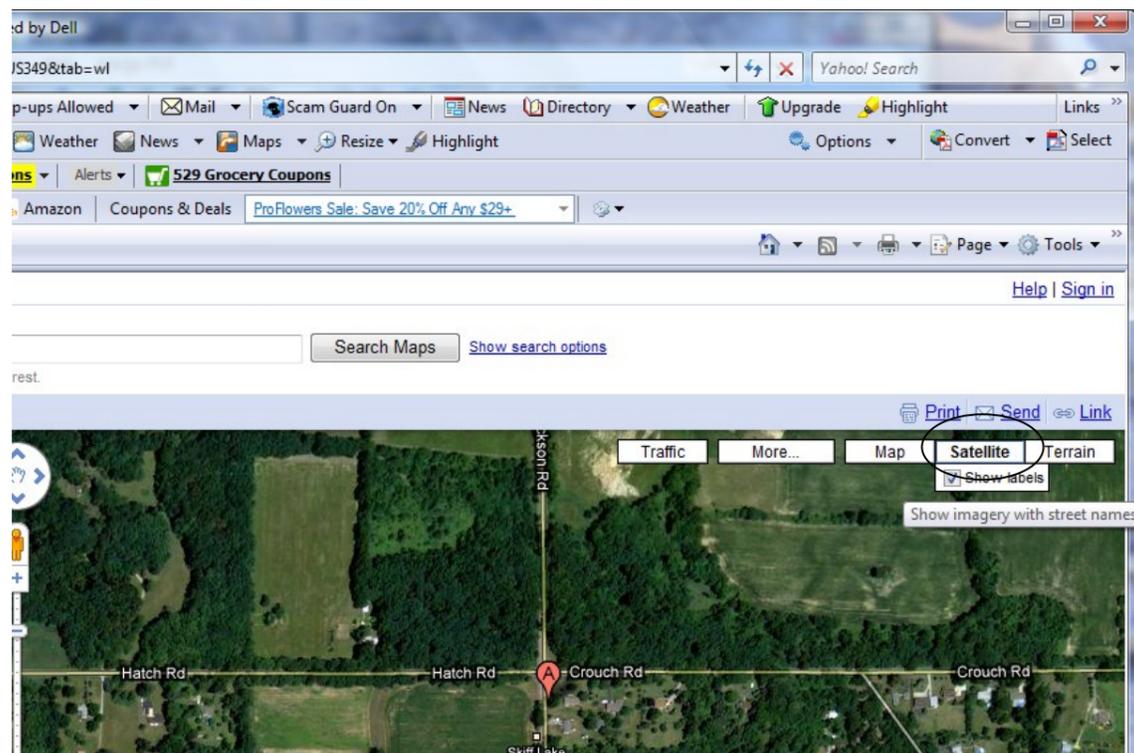
1. Go to Google Maps by clicking on the "Maps" link in the upper left hand corner of the Google home page. See the link circled in the picture below.



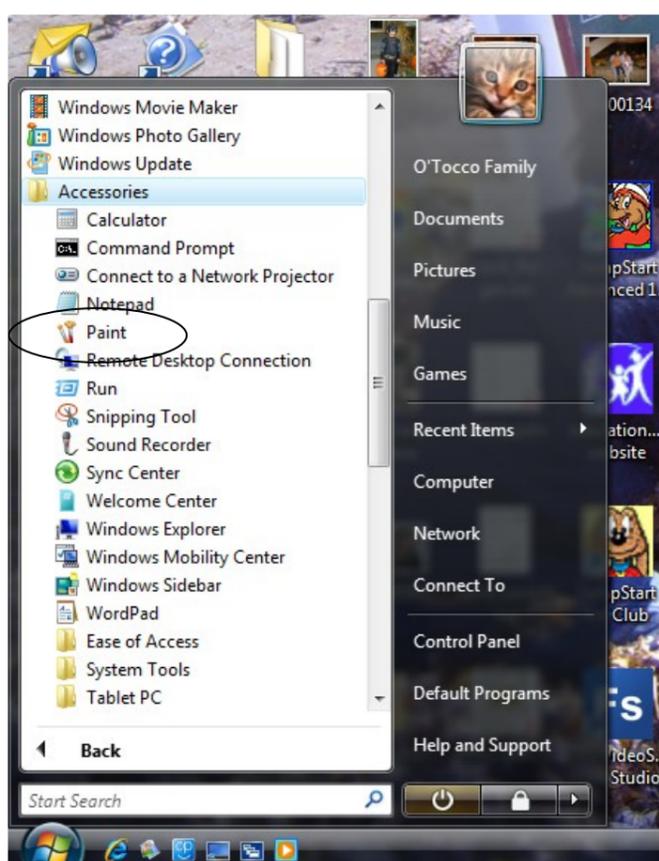
2. Enter the address in the search bar. See the search bar circled in the picture below. Pressing the "Search Maps" button will bring up the area that has the parcels on it.



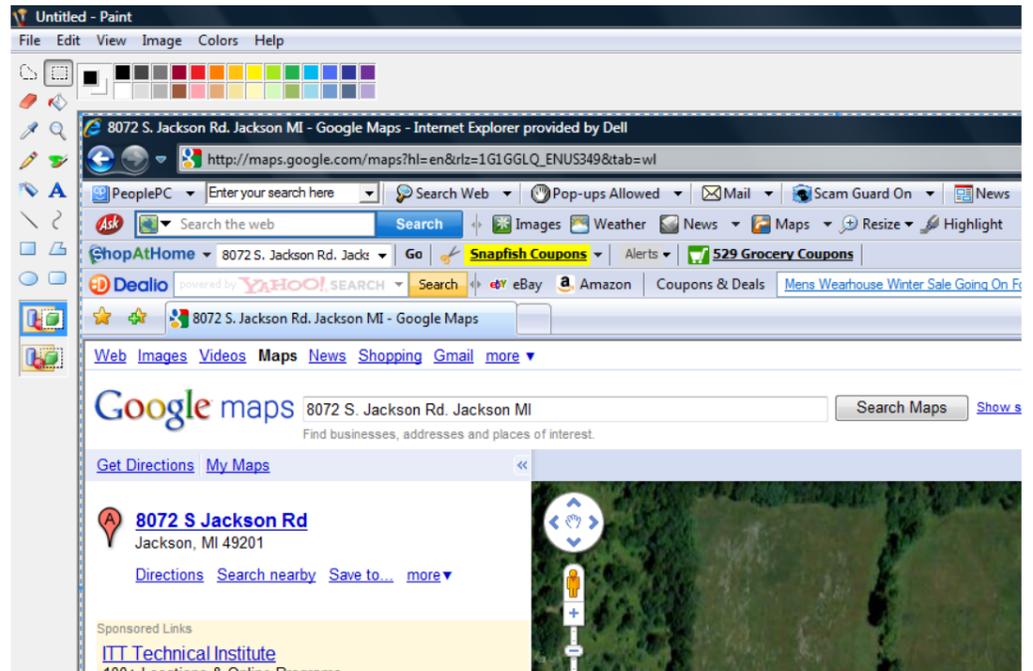
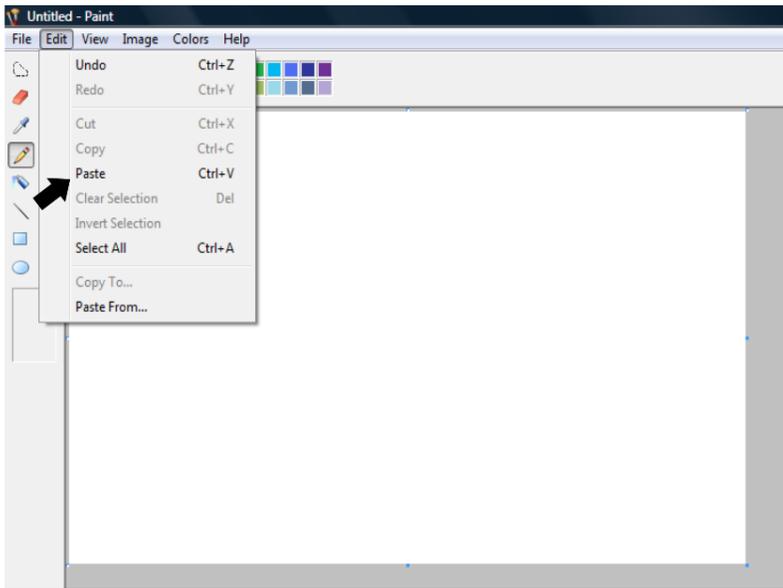
3. Toggle on the satellite imagery by pressing the “Satellite” button. The Satellite button is circled below. Pressing it will bring up the aerial photography.



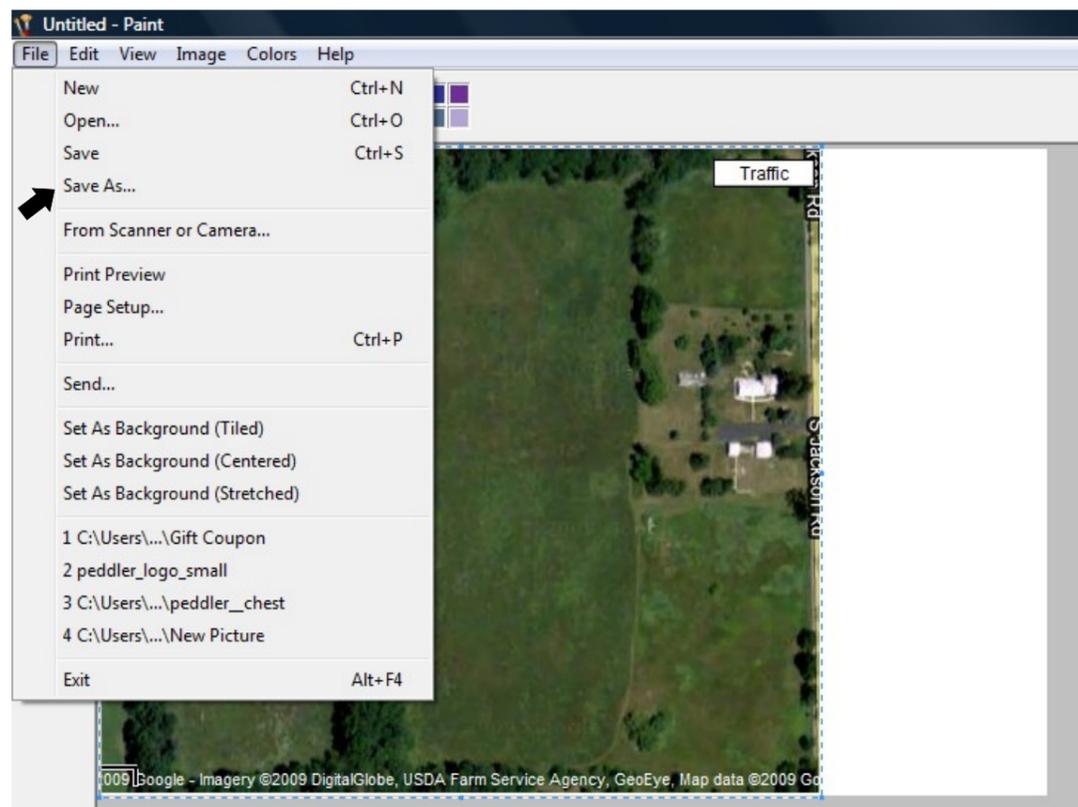
4. Adjust the map to capture the fields you want by dragging them into view on the screen. Then press the print screen button in the upper right hand corner on your keyboard. Open the “Paint” program on your computer. You can find it in the Accessories folder. “Paint” is circled in the picture below.



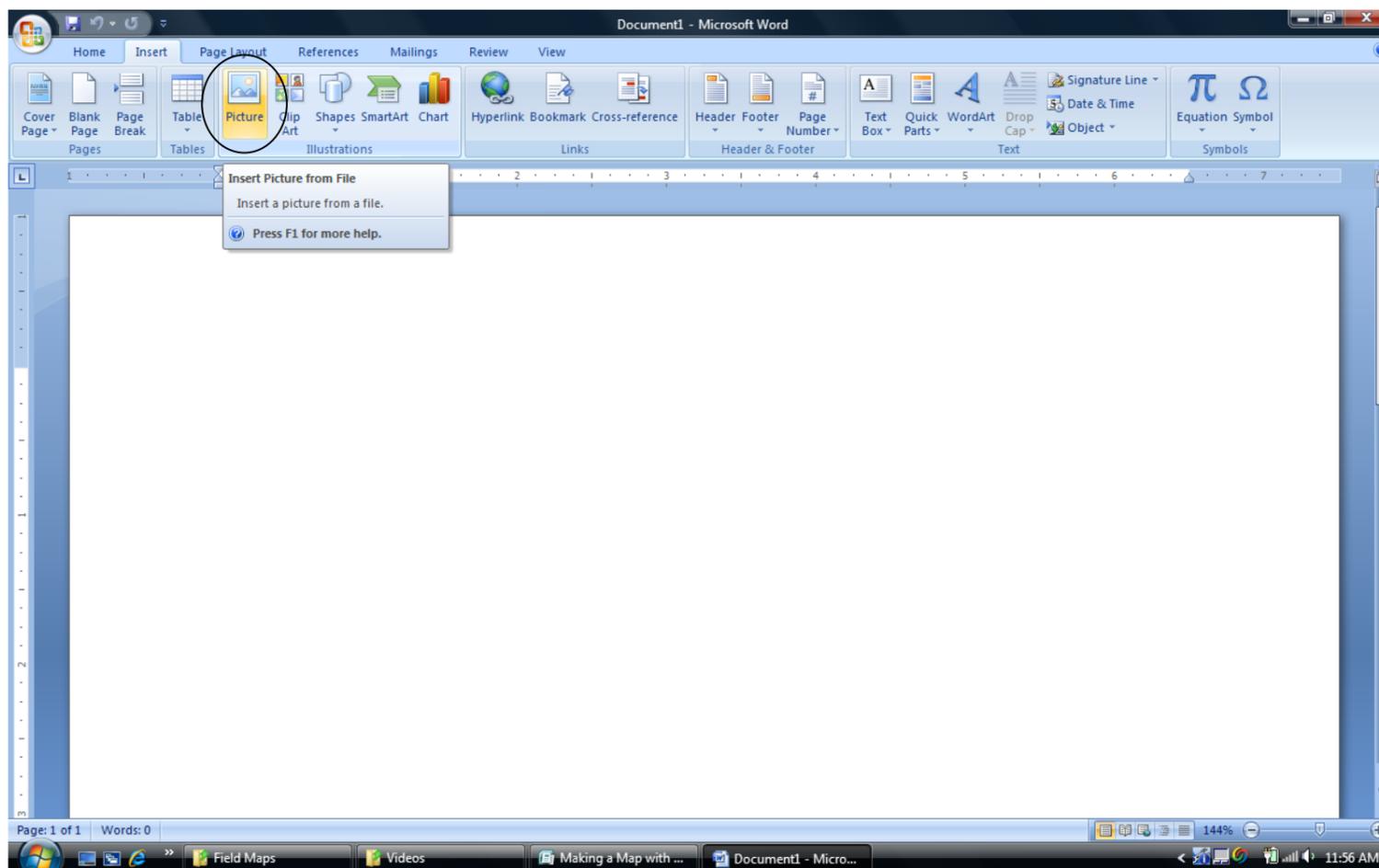
5. Once the program opens, paste the screen in the blank open window. The two screenshots below show the before and after pasting into a Paint window.



6. Cut the area of the map you want and save it as a JPEG file for import into Word or another word processing program.



7. Open Microsoft Word and insert the JPEG into the new Document. You can see the insert picture button circled in the screenshot below.



8. Add the title and contact information around the map. Then either use the box tool or draw boxes around each of your fields.

