



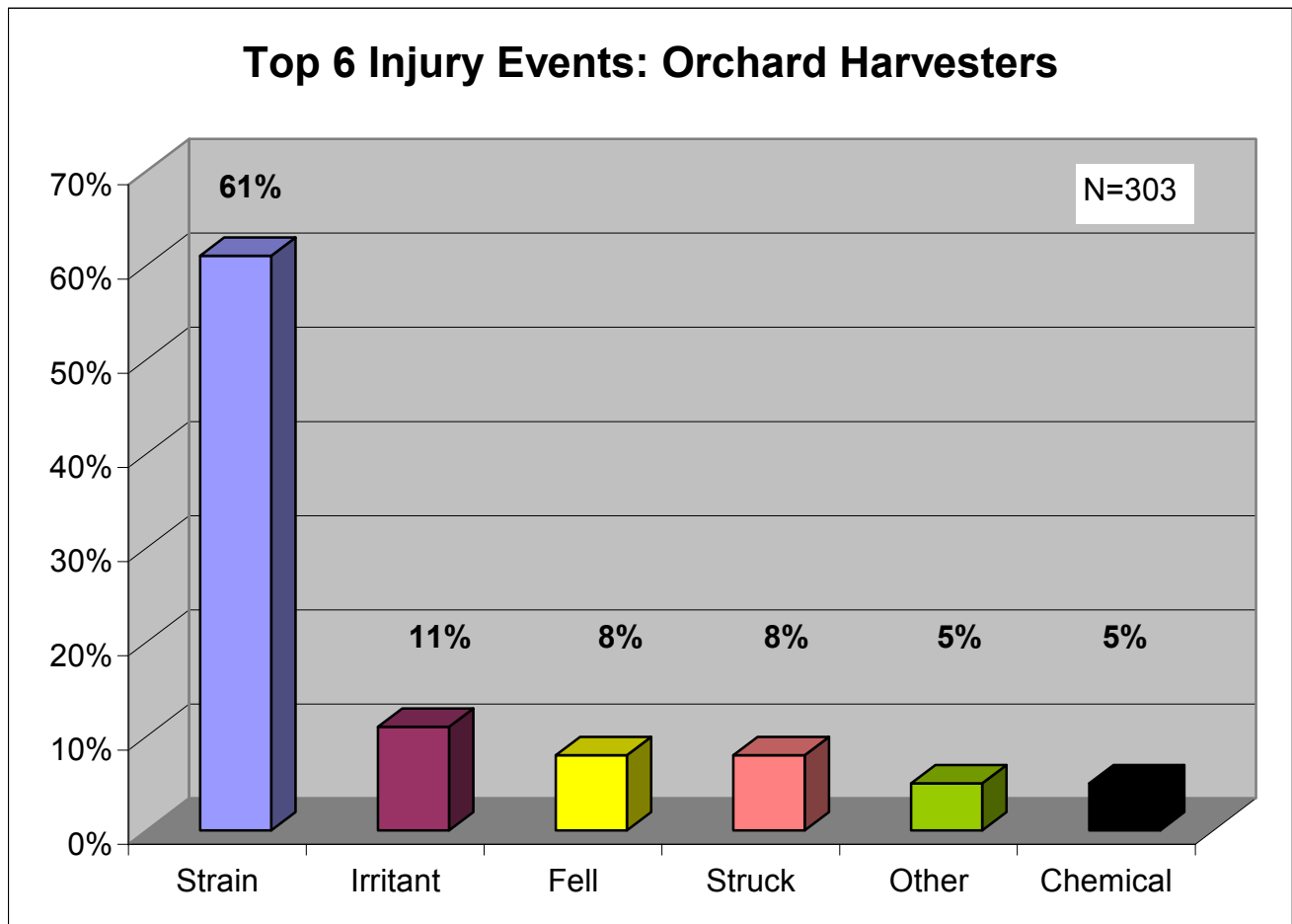
I. Occupational Health Profile Apple Workers

Apples are grown and harvested throughout the Northeast and each stage of production presents the potential for work-related injuries and illnesses. The following pages contain information unique to apple harvesting on:

- Injury events, diagnosis, contributing factors.....pages 1-2
- Map of Northeast Apples.....page 3
- Musculoskeletal injuries.....pages 4-7
- Natural irritantspages 8-9
- Pesticide exposures..... pages 10-11
- Pesticide exposure study.....pages 12-13

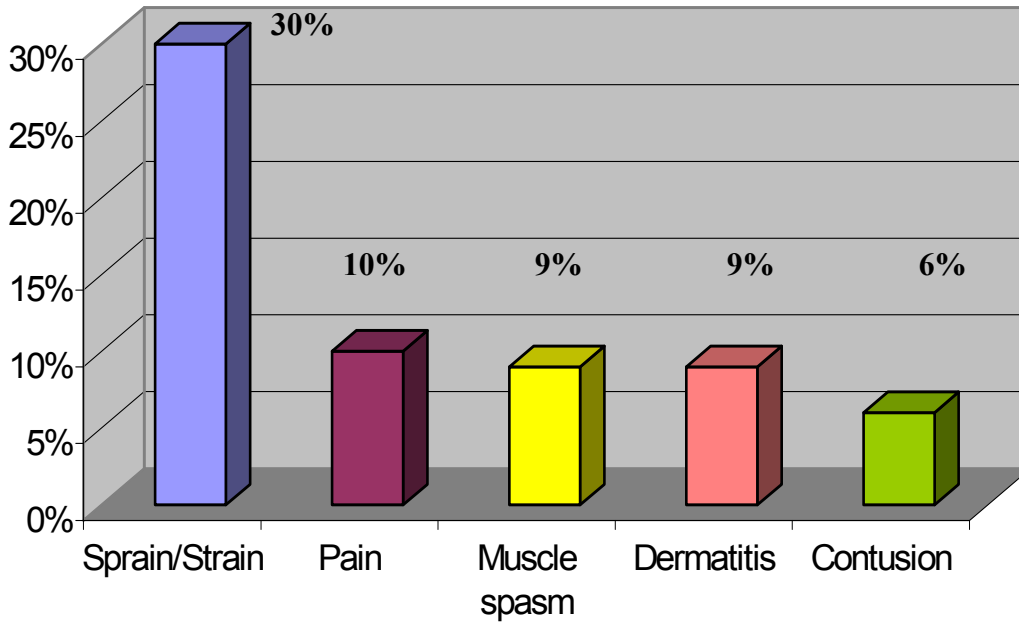
Medical Conditions Commonly Seen in Orchard Harvesters

Results from a 3 year NEC surveillance study taking place in ME, MA, CT, NY, NJ, PA and MD at federally-funded Migrant Health Centers. Injury and Illness events were documented in patient medical charts and close to 1700 injuries and illnesses were identified in all commodities.



Medical Conditions Commonly Seen in Orchard Harvesters

Diagnoses: Orchard Fruit-Top 5



Safety Training Materials

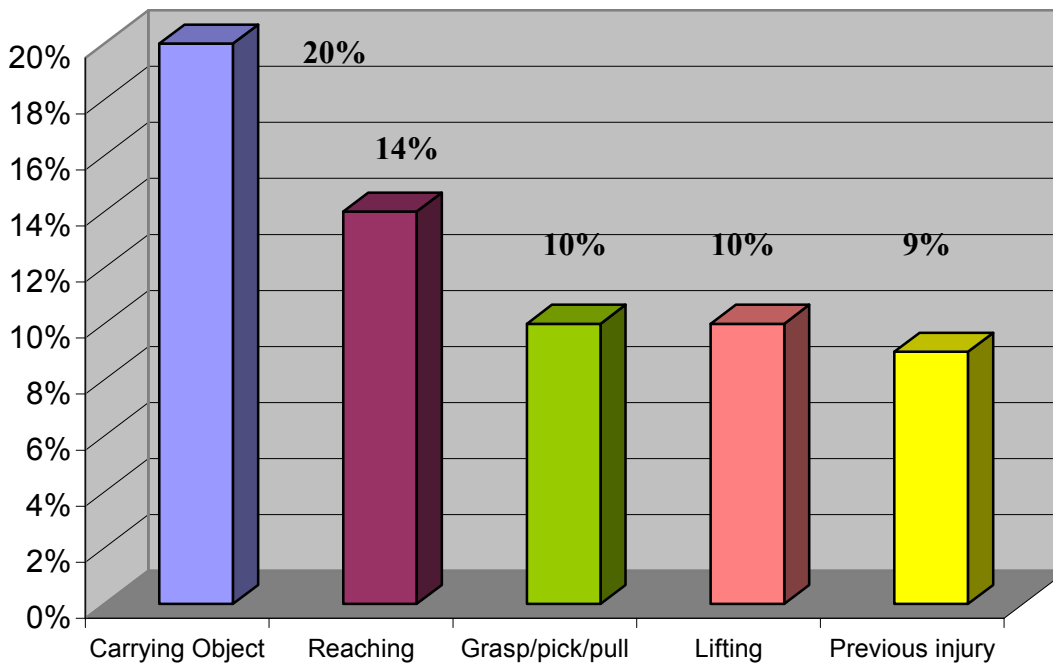
Training materials are available free in limited quantities to farm-worker programs.

• **Posters**

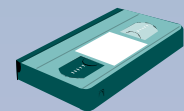
- Back Strain
- Ladder Use
- Poison Ivy
- Lifting
- Eye Protection
- Tractor Safety
- West Nile Virus
- Lyme Disease



Contributing Factors: Orchard Fruit-Top 5



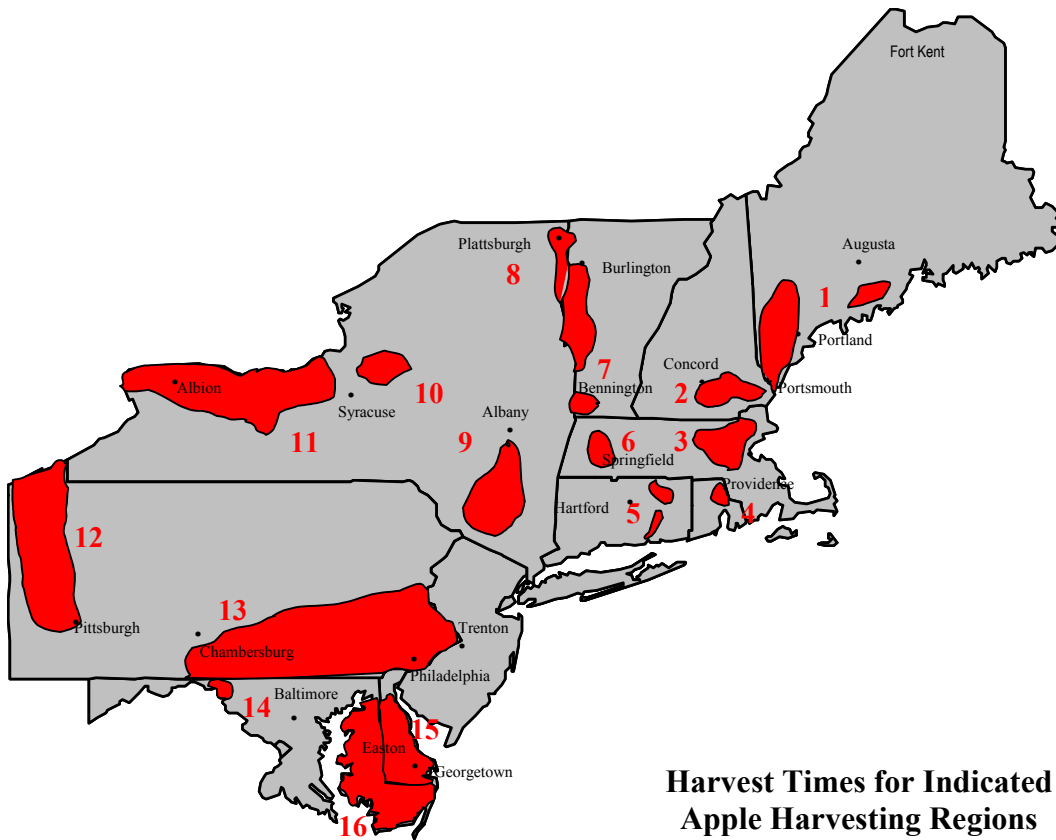
- Check stuffers
- Videos



- Personal Protective Equipment

To order: contact NYCAMH at 1(800)343-7527.

Areas of Apple Harvesting in the Northeast



**Harvest Times for Indicated
Apple Harvesting Regions**

- 1. Maine: Southwestern, Sept. 8—Oct. 25**
- 2. New Hampshire: Manchester, Sept. 10—Oct. 30**
- 3. Massachusetts: Central, Sept. 1—Oct. 31**
- 4. Rhode Island: Northeastern, Sept. 5—Oct. 31**
- 5. Connecticut: Northeastern, Sept. 1—Oct. 31**
- 6. Massachusetts: Western, Sept. 1—Oct. 31**
- 7. Vermont: Western, Sept. 1—Oct. 31**
- 8. New York: Champlain Valley, Sept. 15—Oct. 31**
- 9. New York: Hudson Valley, Aug. 15—Nov. 10**
- 10. New York: Central, Sept. 1—Nov. 10**
- 11. New York: Western, Sept. 10—Nov. 10**
- 12. Pennsylvania: Western, Sept. 15—Nov. 15**
- 13. Pennsylvania: Southeastern, Sept. 15—Nov. 15**
- 14. Maryland: Western, Sept. 10—Oct. 17**
- 15. Maryland: Eastern Shore, Sept. 10—Nov. 1**
- 16. Delaware: Central/Southern, July 1—Aug. 1 (early)/ Sept. 10—Nov. 15 (late)**

II. The Orchard Workplace

Musculoskeletal Injuries-Most frequent work-related injury complaint by orchard harvesters

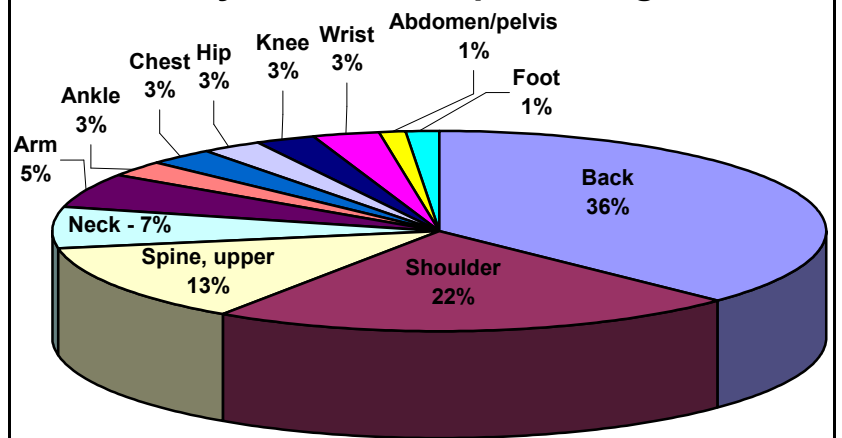
Tree Pruning Conditions:

- Wide variations in temperature, can be wet.
- Tools-pruners, requires repetitive pin-cer grasping.
- Physical hazards-branches in front of and above workers.
- Climbing either by ladder or standing on bottom limbs.

Apple Harvesting Conditions:

- Working piece rate, emphasis is on speed.
- Standing on ladders and filling bags weighing up to 40 pounds.
- Bucket is carried on one side or the other by either one or two nylon or cotton straps.
- Hazardous postures (back strain): picking with arms overhead (25% of work day), bending to empty the picking bucket into the bin, carrying a full apple bag down ladder and across the orchard, bags often carried on one side (leaves worker off-balance) and carrying and setting the ladder. Also, rolling large bins in place (weighing up to 200 pounds) can cause leg or back strain.

Part of Body with Strain/Sprain Diagnoses:



These conditions are also affected by tree size classes:

Dwarf Trees (6' high):

- Less reaching overhead
- More bending/kneeling
- Maneuvering around support wires
- Doesn't require ladders

Semi-Dwarf Trees (8-9' high):

- Most common trees
- Apples are farther apart than dwarf tree class-more reaching. This combined with weight of bag strap on neck can cause strain.

Standard Trees (20-23' high)

- Much more ladder climbing
- More reaching (apples farther apart)
- Fall hazard greater
- Necessitates more ladder moving.



Commodities-Apple

Musculoskeletal Injuries-*Most frequent work-related injury complaint by orchard harvesters*

- **A breakdown of amount of time engaged in work with the potential to create strain/sprain;**

79% carrying a full or partially full bag of apples

63% picking (reaching over, pulling fruit/twisting apple to separate from stem, bagging fruit)

8% releasing apples into bin (lifting, bending)

4% moving ladder (lifting, carrying)

3% climbing ladder (with bag, up or down)

Releasing Apples Into The Bin



Worker in bending posture, with one strap connected to apple bag. Presents increased strain to one shoulder, whereas two straps might distribute weight more evenly.



Bending to release apples into bin. Approximately 8% of day spent in this posture. Apple bag when full weighs about 40 pounds, depending on the variety.

Reaching to Pick Apples



Worker reaching over head to pick apples with weight of apple bag applying a downward force. Approximately 63% of work day engaged in this activity.

Carrying Ladder



Worker carrying ladder to next tree. 4% of work day involved in this type of activity. Ladders are either of aluminum or wood construction.

Musculoskeletal Injuries-Most frequent work-related injury complaint by orchard harvesters

Proportion of time spent in awkward postures:

expressed as percentage of harvesting day (full buckets can weigh as much as 40 lbs.)



Information gathered using PATH analysis in orchards. PATH is an acronym that stands for Posture-Activities-Tools-Handling. This method of analysis allows for the quantification of ergonomic risk factors in work tasks.

Musculoskeletal Injuries - Possible Improvements

Ergonomically Improved Apple Bag



Wearing bucket on front: two shoulder straps, crossed in back, bucket on middle hook of hip belt



Wearing bucket on side: strap doubled over across one shoulder; bucket on side hook of hip belt

NYCAMH researchers and the state's orchard community have been working together to develop an improved apple bag and strap system for apple picking.

The new system was devised in a series of meetings with apple producers and apple pickers, extension personnel and others.

Subsequent laboratory testing at Penn State University indicates that by transferring some of the bag weight down to the hips, the improved picking bag reduces the load on the upper back, neck and shoulders.

92% of workers said they would use the hip belt with the hook for bucket attachment if it were available
-NYCAMH study

The hip belt with the bucket attachment proved to be quite popular with workers. A project is now underway to test this over the course of several harvest years.

Workers commented that they liked the support, and that they felt less fatigue and pain in the back and shoulders. The main criticism they had was that the attachments on the belt got caught on things. Some workers also told us verbally that they didn't like having to lift the full bucket off the belt attach-

Skin Irritation-Second most frequent work-related injury complaint by orchard harvesters

Exposure to Natural Irritants-11% of occupational health visits

“Natural Irritants” includes:

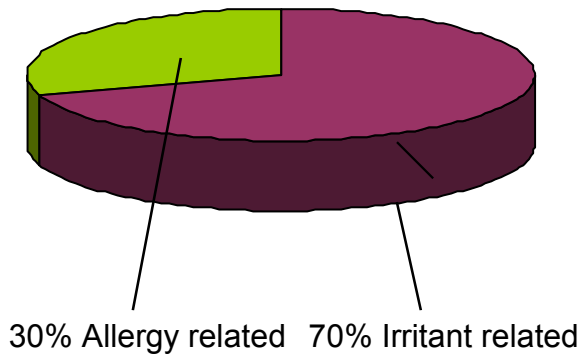
- ➔ Dust
- ➔ Sun
- ➔ Pollen
- ➔ Water
- ➔ Plants (i.e. peach fuzz, poison ivy, etc...).

These skin irritations presented as:

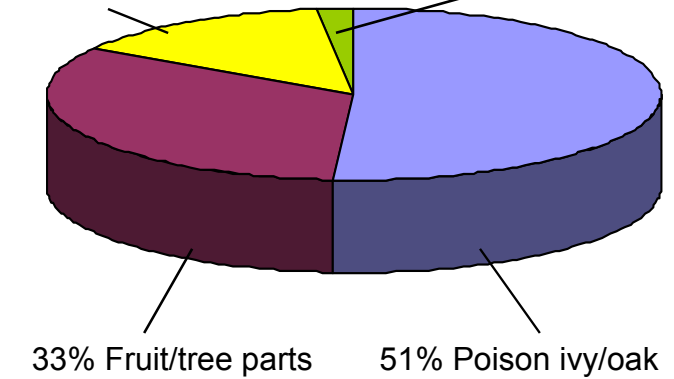
- ➔ Hives
- ➔ Eczema
- ➔ Dermatitis
- ➔ Burns

90% of Occupational Dermatitis is Contact Dermatitis

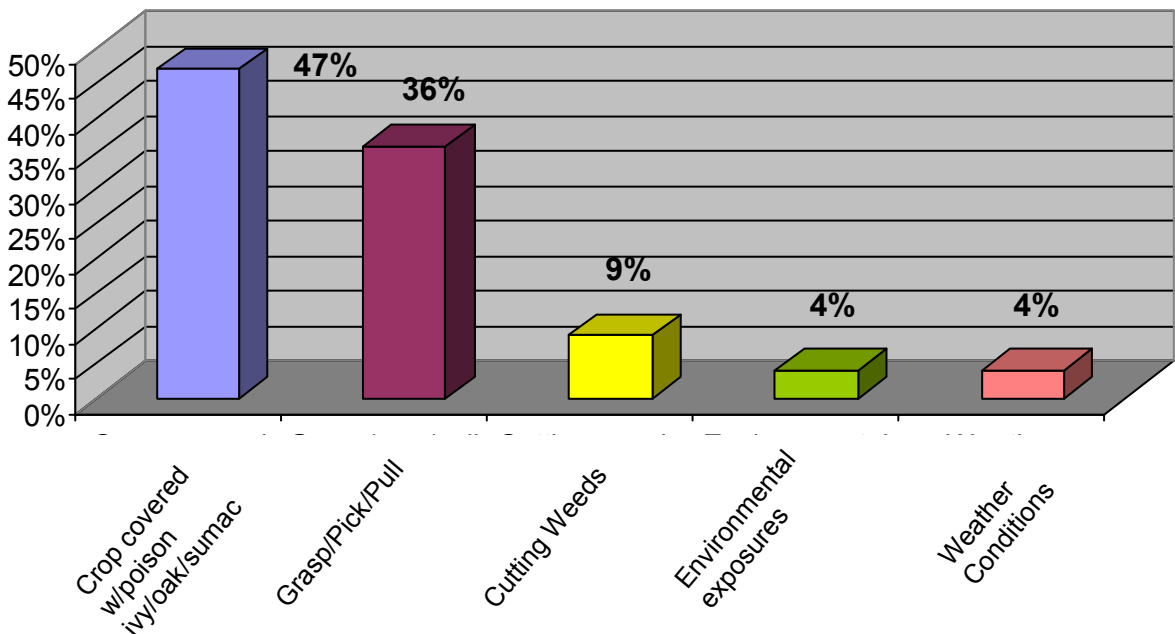
Contact Dermatitis Cases



Orchard Exposures



Factors Contributing to Orchard Skin Irritations



Skin Irritation-Second most frequent work-related injury complaint by orchard harvesters

31% of skin irritation experienced by orchard workers was connected with poison ivy exposure according to the NEC Multi-State Study.



Poison Ivy Safety



Spring



Summer



Fall

Keep poison ivy off your skin.

Know what poison ivy looks like:

Has 3 leaves on the stem.
Leaves may be red or green.
Sometimes has ivory berries on the stem.

Before work:

Wear long sleeve shirt and long pants.
Wear gloves.
Apply prevention lotion to skin that can't be covered.

After work:

Wash work clothes separately from others.
Clean boots, gloves, and tools to remove poison oil.
Wash exposed skin with soap and water.



"Last year when I was pruning I got poison ivy on my ankles. It was very itchy and sore."



Project paid for in part by the makers of IvyBlock poison ivy prevention lotion.

Poison Ivy is frequently found in orchards for several reasons:

- ➔ Fruit trees provide the perfect structure for poison ivy to attach and climb.
- ➔ It prefers shade and undisturbed soils, conditions which are perfectly accommodated by orchard floors.
- ➔ Growers often spray herbicides beneath trees to keep undergrowth closely cropped. Poison ivy is immune to many of these chemicals, so competition from other plants is eliminated and poison ivy can spread freely.

Poison Ivy Posters are available in English, Spanish and Haitian-Creole from NYCAMH/NEC. Call 1-800-343-7527 for more information.

Skin Irritation-Second most frequent work-related injury complaint by orchard harvesters

Chemical Exposures-5% of occupational health visits

Difficulties in diagnosing chemical exposures include:

- (1) Nonspecific symptoms
- (2) Patients lack of exposure knowledge.

Important on-site requirements for growers that can help you with diagnosis and treatment:

- (1) Pesticide information should be posted in the field in a central location.
- (2) A decontamination site for chemical handlers is required.
- (3) Information on chemical exposures to farmworkers and their care-givers is mandatory.
- (4) Growers need to conform to REI (Restricted Entry Interval) recommendations:
 Generally the REI is 12 hours
 For pesticides with a Caution label the REI is 24 hours
 For pesticides with a Danger label the REI is 48 hours
 This is a general rule and some exceptions do exist.

***Pesticides Used on Northeastern Apples: Additional Summer Sprays-NY, New England, NJ, PA**

Toxicology	Chemical Family	Common Name	Product Name	Treatment
Carbamates affect the CNS and symptoms include fatigue, weakness, dizziness, sweating, headache, nausea, cramps, diarrhea, muscle twitching and slurred speech. Seizures, coma and cardiorespiratory depression can occur with higher doses.	Carbamates	Manzate	Dithane/Manzate /Penncozeb	Clear patient's airways, give oxygen if necessary. Administer atropine sulfate. Decontaminate skin by removing clothing and washing skin and hair thoroughly with soap and water. Flush eyes with clean water 10-15 minutes. Avoid adrenergic amines unless absolutely necessary.
		Methomyl	Lannate 2.4L, 90SP	
		Manzate	Manex 4F	
		Metiram	Polyram 80 DF	
		Carbaryl	Sevin 4F, 50 WP, 80 WS	
		Carbaryl	Sevin XLR Plus 4EC	
		None	Topsin-M 70WP	
		Oxamyl	Vydate 2L	
Organophosphate exposure affects nerve-endings and symptoms include headache, nausea, dizziness, sweating, salivation, muscle twitching, weakness, tremors, cramps, confusion, blurred vision or tightness in the chest (trouble breathing).	Organo-Phosphates (Exposure can be determined by a cholinesterase test)	Azinphosmethyl	Azinphosmethyl 50WP Azinphos-M 50WS Guthion 50WS	Clear patients airways, administer oxygen if necessary. Administer atropine sulfate. Glycopyrolate can be effective with continuous infusion. Pralidoxime can be administered if organophosphate exposure is known and patient is experiencing a severe poisoning. Decontaminate skin by removing clothing and washing skin, hair thoroughly with soap and water. Flush eyes with clean water 10-15 minutes.
		Phosmet	Imidan 70WP	
		dimethoate	Dimethoate 4EC	
		Chlorpyrifos	Lorsban 4EC, 50WS	

**This is not an exhaustive list of pesticides (there are currently over 20,000 chemical on the market). This list contains only those pesticides that migrant and seasonal apple harvesters are most likely to encounter.*

**NPTN-National Pesticide Telecommunication Network—Offers assistance for diagnosis, treatment, and investigation of pesticide exposures
1-800-858-7378 9:30-7:30 EST**

Toxicology	Chemical Family	Common Name	Product Name	Treatment
Dermal absorption varies and most of the dose is stored in fat tissue. These substances mainly affect the nervous system. Exposure symptoms include headache, dizziness, tremor, confusion, hyperesthesia and paraesthesia and convulsions.	Organo-chlorines	Diazinon	Diazinon 50 WP	Convulsions should be treated with anticonvulsants and patient should be taken to a trauma center if there is no reduction in seizures. Benzodiazepines therapy is recommended. Administer oxygen, decontaminate skin by removing clothing and washing skin, hair thoroughly with soap and water. Flush eyes with clean water 10-15 minutes. Do not give patients any drugs, which would increase myocardial irritability.
Risk of systemic toxicity is low, however, central nervous system toxicity while uncommon, is more dangerous and can result in seizures or disturbed consciousness.	Synthetic Pyrethroid		Asana XL 0.66EC	Dermal exposures-Use soap and water to remove from skin, keep vapors from eyes and face. Use Vitamin E to avoid parasthetic reaction. Eye exposures can be dangerous, use clean water or a saline solution to flush eyes. For recent ingestions of large quantities GI decontamination is a good option. If amount ingested is small or treatment delayed oral treatment with activated charcoal is recommended.
BTs are considered a natural pesticide agent and human infections have been rare. Only one recorded human ingestion of BT has resulted in fever and GI symptoms. Skin manifestations such as irritation or sensitization have not been reported from mixers or applicators working with this product	Bacillus Thuringiensis	Bt	Biobit XL 2.1 FC, HP 6.4WP	Dermal exposures-Use soap and water to remove Bt from skin. Use clean water or a saline solution to flush eyes. For ingestion watch patient for signs of bacterial gastroenteritis. Treat symptomatically and give fluid support.
		Bt	Aza-Direct 1.2L	
		Bt	Dipel 10.3 DF	
		Bt	Bt endotoxin formulation	
	Other	Streptomycin	Agrimycin 17WP	(If a large, recent ingestion has occurred, the physician should consider inducing vomiting).

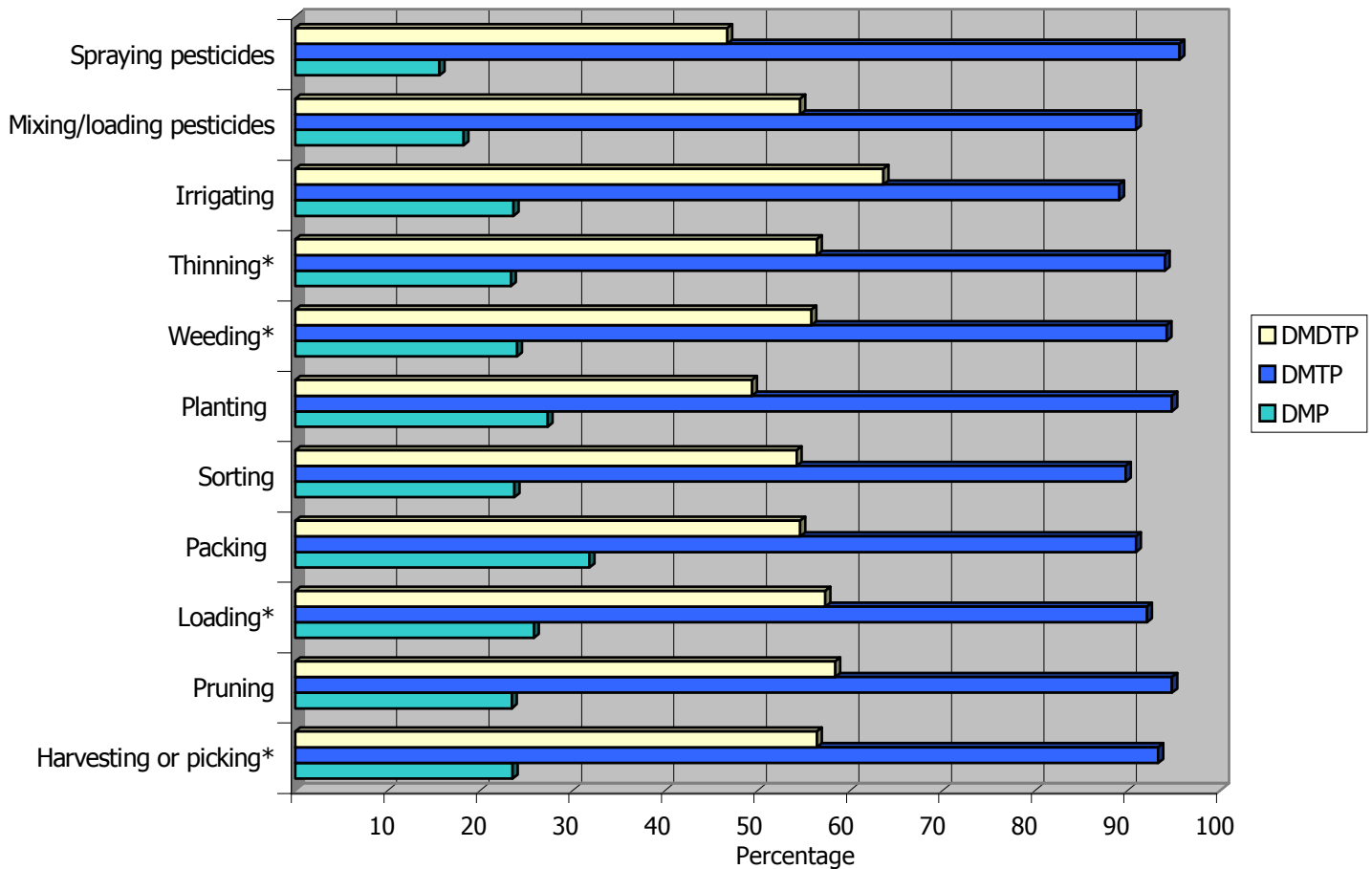
Information on this list of pesticides:

- It is a compilation of pesticides recommended by integrated pest management researchers in New York, New Jersey, Pennsylvania and New England for apple growers (largest apple producing states).
- Gathered from state tree fruit guidelines-only those listed as “additional summer sprays” (those likely to be used directly prior to harvesting when migrant and seasonal farmworkers are working in fields)
- Information on toxicology and treatment was gathered from: material safety data sheets and the EPA publication “Recognition and Management of Pesticide Poisonings” (for a free copy call 703-305-7666)

Pesticide Exposure of Washington State Farmworkers by Job Task

- Primary crops are apples, cherries, grapes, hops, peaches and pears
- Association between occupational task and organophosphate (OP) metabolic concentrations in urine samples and OP pesticide residues in dust were determined in 211 farmworkers and their homes
- 50 % of population is Hispanic

Percent detectable dimethyl urinary metabolites among adult farmworkers



Tasks with an asterisk (*) indicate those jobs that workers spent over 40% of their time involved in

- The graph above was developed after collecting 2 or 3 urine samples from each farmworker over a 2-week period.
- The samples were analyzed to detect 3 different compounds produced by the metabolism of most OP pesticides: dimethylphosphate (DMP), dimethylthiophosphate (DMTP), and dimethyldithiophosphate (DMDTP).

Pesticide Exposure Study Findings

- The proportion of **detectable levels of DMP** among workers who **performed fieldwork was greater** compared to workers who mixed, loaded, or applied pesticides
- Workers who mixed, loaded, or applied pesticides had significantly less pesticide residues in their vehicles and homes
- **Workers performing fieldwork are not required to wear gloves and other protective equipment like workers that mix, load, or apply pesticides.**
- **Workers who thin are at high risk** for greater proportions of dimethyl urinary metabolites as they are **allowed to work on the crops 7 days after OP pesticides are applied**, which is 7 days before all other workers can begin their work.
- Thinner have significantly higher levels of pesticide residues in their vehicles and homes.
- **Children of thinners exhibited greater proportion of dimethyl urinary metabolites than children of other workers.**



<http://www.btny.purdue.edu/Pubs/PPP/ppp-38.pdf>

Conclusions

- **All farmworkers are at risk for pesticide exposure so it is very important to wear gloves, hats, and other protective equipment**
- **The levels of personal exposure to pesticides may directly effect the concentration of pesticides in the home environment and the risk of exposure of family members**

Coronado, Gloria D.; Griffith, William C; Islas, Ilda; Strong, Larkin; and Thompson, Beti. "Agricultural Task and Exposure to Organophosphate Pesticides Among Farmworkers." *Environ Health Perspect* 112: 142-147 (2004).

You may access this study online by typing in the following code in the "doi" box: 10.1289/ehp.6412 via <http://dx.doi.org/> [Online 22 October 2003].

Pesticide Resources

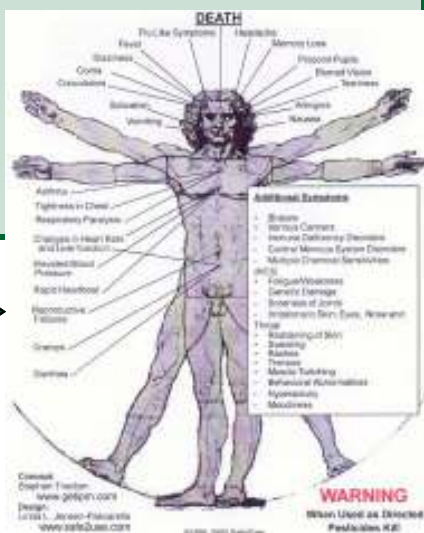
Resources for symptoms:

PAN's Symptoms of Pesticide Poisoning Poster:

www.pan-uk.org/gifs/pegpost.GIF

Symptoms of Pesticide Poisoning Diagram:

www.getipm.com/html/symptoms.htm



Pesticide Action Network (PAN) Database:

Pesticide Poisoning Diagnostic Tool:
www.pesticideinfo.org/Search_Poisoning.jsp



Alphabetized Chemical List:
www.pesticideinfo.org/List_ChemicalsAlpha.jsp

Chemical Search: http://www.pesticideinfo.org/Search_Chemicals.jsp

General resources:

National Pesticide Information Center (NPIC): <http://npic.orst.edu>
NPIC Hotline: 1-800-858-7378

The National Environmental Education and Training Foundation (NEETF):
<http://neetf.org>



Pesticides Resource Library:
<http://neetf.org/Health/pestlibrary.shtm>

Pesticides Resources Inventory:
<http://neetf.org/Health/inventory.htm>

Environmental Protection Agency:
Pesticides: www.epa.gov/pesticides

Environmental Protection Agency's Pesticide Poisoning Handbook:

Recognition and Management of Pesticide Poisonings, by J. Routt Reigart and James R. Roberts.

Available online at:

www.epa.gov/pesticides/safety/healthcare/handbook/handbook.pdf