Musculoskeletal Injuries—Contributing Factors and Parts of the Body
Make up 40% of work-related injuries of tobacco workers

Part of Body with Strain/Sprain Diagnoses:

- Back: 34%
- Arm: 9%
- Leg: 9%
- Shoulder: 8%
- Neck: 8%
- Wrist: 8%
- Finger: 4%
- Elbow: 4%
- Rib: 4%
- Shin: 4%
- Thumb: 4%

Contributing Factors of Strain Injuries:

- Bending/Stooping: 52%
- Lifting: 9%
- Weather Conditions: 3%
- Grasp/pick/pull: 9%
- Carrying object: 6%
- Other: 6%
- Reaching: 3%
- Cutting weeds: 3%
- Chopping/cutting: 3%
- Repetitive motion: 3%
- Awkward posture: 3%
During “topping” season (cutting off tobacco flowers from the tops of plants), workers make repetitive motions.
► Workers must repeatedly reach for the flowers on top of the plants, causing pain/strain.
► Repetitive, quick motions are made when cutting off the flower, which may cause repetitive strain injuries.

Right: Tobbaco topping

During “priming” season (picking tobacco leaves), harvesters must work in various awkward positions.
► 1st priming: Must sit or severely bend to reach the leaves (shown right).
► 2nd and 3rd primings: Must kneel or stoop for long periods of time.
► Rest of primings: Depending on plant height, may have moderate trunk flexion or may stand up straight to reach leaves (shown below).

Workers must also make repetitive movements during priming season.
► Leaves are “snapped” in either a quick, upward motion or a traditional quick, downward motion causing repetitive strain injuries.


Moderate to severe trunk flexion occurs while priming, shown above.
Chemical Injuries—Make up 5% of work-related injuries of tobacco workers

Most Common Diagnoses of Chemical Injuries:

- Pesticide reaction: 17%
- Trauma: 17%
- Allergies: 33%
- Dermatitis: 33%
- Pesticide reaction: 17%

Part of Body with Chemical Diagnoses:

- Skin - general: 17%
- Shoulder: 17%
- Neck: 17%
- Arm: 32%
- Eye: 17%
- Crop covered w/pesticides: 25%
- Inadequate protective gear: 25%
- Chemical exposure: 50%

Contributing Factors of Chemical Injuries:
► 37 pesticides approved by EPA were commonly used on tobacco in the United States in the 1990s.
► Over 25 million pounds of pesticides are used in tobacco production in the US.
► Tobacco ranks 6th in the amount of pesticides applied per acre among all agricultural commodities.
► EPA has set supposed safe levels of exposure, but if these conditions aren’t followed, harmful effects can occur.
► 17 out of the 37 pesticides commonly used on tobacco belong to three classes that could cause adverse health effects at high doses, including death. These classes are explained below.

Right: A pesticide is applied to burley tobacco after topping in order to prevent the growth of suckers.

**Organochlorines, organophosphates, and carbamates:** Chemical classes of harmful pesticides at high doses.
- Act on the nervous system to prevent normal flow of nerve impulses to muscles controlling both voluntary and involuntary movement.
- Pesticides in these 3 classes are absorbed at various rates through inhalation, ingestion, and skin contact.
- Typical symptoms of exposure are fatigue, weakness, dizziness, sweating, headache, nausea, cramps, diarrhea, muscle twitching, confusion, and cramps.
- Many of the pesticides in these classes are thought to cause cancer and birth defects.
  ► For more specific details and symptoms, see the chart on the next page.


**Treatment of pesticide exposure:**

**Carbamates:** 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.

**Organophosphates:** Clear patients airways, administer oxygen if necessary. Administer atropine sulfate. Glyco-pyrolate can be affective with continuous infusion. Prali-doxime can be administered if organophosphate exposure is known and patient is experiencing a severe poisoning. Decontaminate skin by removing clothing and washing skin and hair thoroughly with soap and water. Flush eyes with clean water 10-15 minutes.

**Organochlorines:** 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 and hair thoroughly with soap and water. Flush eyes with clean water 10-15 minutes. Don’t give patients any drugs that would increase myocardial irritability.
## Chemical Injuries—*Pesticides used on tobacco*

<table>
<thead>
<tr>
<th>Pesticide</th>
<th>Primary Use</th>
<th>Pounds used on tobacco (1997)</th>
<th>Chemical Class &amp; Exposure Symptoms</th>
<th>Toxicity to mammals</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3-dichloroprene</td>
<td>Fungicide, insecticide, herbicide</td>
<td>13,279,285</td>
<td>These pesticides, along with many others, represent 12 other chemical classes ranging from mild to severe.</td>
<td></td>
<td>These were the top 3 pesticides used on tobacco in 1997.</td>
</tr>
<tr>
<td>Chloropicrin</td>
<td>Fumigant, insecticide</td>
<td>6,761,644</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maleic hydrazide</td>
<td>Plant growth regulator, herbicide</td>
<td>1,790,089</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endosulfan</td>
<td>Insecticide</td>
<td>172,766</td>
<td>Organochlorine: Persist in environment and accumulate in body tissue. -Symptoms of exposure include headache, dizziness, tremor, confusion, hyperesthesia &amp; paraesthesia, and convulsions. -Associated with cancer &amp; damage to neurological and reproductive systems. -Largely replaced by organophosphates and carbamates.</td>
<td>High</td>
<td>Highly toxic when ingested or inhaled.</td>
</tr>
<tr>
<td>Acephate</td>
<td>Insecticide</td>
<td>871,899</td>
<td>Organophosphate: Break down quickly in environment but are much more acutely toxic. -Exposure can be determined by a cholinesterase test. -Symptoms of exposure include nausea, headache, dizziness, sweating, salivation, tremors, cramps, confusion, blurred vision, tightness in the chest (taste breathing), muscle twitching, anxiety, and depression.</td>
<td>Low</td>
<td>May cause cancer.</td>
</tr>
<tr>
<td>Chlorpyrifos</td>
<td>Insecticide</td>
<td>406,822</td>
<td></td>
<td>Low</td>
<td>May cause birth defects at very high levels and may harm pregnant female.</td>
</tr>
<tr>
<td>Fenamiphos</td>
<td>Insecticide</td>
<td>379,841</td>
<td></td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Ethoprop</td>
<td>Insecticide</td>
<td>182,321</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diazinon</td>
<td>Insecticide</td>
<td></td>
<td></td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Disulfoton</td>
<td>Insecticide</td>
<td>13,495</td>
<td>-Symptoms can develop during use of pesticides or minutes to hours later. -Inhalation exposure results in most rapid appearance of toxic symptoms. -May cause respiratory failure and decreasing heart rate, progressing to cardiac arrest.</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Fonofos</td>
<td>Insecticide</td>
<td>16</td>
<td></td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Malathion</td>
<td>Insecticide</td>
<td>15,437</td>
<td></td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Methidathion</td>
<td>Insecticide</td>
<td></td>
<td></td>
<td>Moderate</td>
<td>May cause cancer.</td>
</tr>
<tr>
<td>Trichlorfon</td>
<td>Insecticide</td>
<td></td>
<td></td>
<td></td>
<td>May cause cancer.</td>
</tr>
<tr>
<td>Pebulate</td>
<td>Herbicide</td>
<td>131,665</td>
<td>Carbamate: Symptoms include fatigue, weakness, dizziness, sweating, headache, nausea, cramps, diarrhea, muscle twitching, and slurred speech. -Symptoms tend to have a shorter duration and are easier to treat. -Seizures, coma, and cardiorespiratory depression can occur with higher doses.</td>
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</tr>
<tr>
<td>Mancozeb</td>
<td>Fungicide</td>
<td>356,811</td>
<td></td>
<td></td>
<td>One out of these six carbamate pesticides and a by-product may cause cancer.</td>
</tr>
<tr>
<td>Aldicarb</td>
<td>Insecticide</td>
<td>59,719</td>
<td>-Symptoms tend to have a shorter duration and are easier to treat.</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Carbaryl</td>
<td>Insecticide</td>
<td>2,057</td>
<td></td>
<td>Low</td>
<td>One pesticide may cause birth defects.</td>
</tr>
<tr>
<td>Carbofuran</td>
<td>Insecticide</td>
<td></td>
<td></td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Methomyl</td>
<td>Insecticide</td>
<td>29,773</td>
<td></td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>


*This is not an exhaustive list of pesticides. This chart contains only pesticides that tobacco workers are most likely to encounter. To see a more comprehensive list, see this resource: Moore JM. Worker protection standards for agricultural pesticides used in tobacco production. Available online at: www.griffin.peachnet.edu/caes/tobacco/handbook/worker-stand98.html (August 4, 2004).