Mountain Pine Beetle (MPB) Treatment Options:
Problems and Alternatives

Pesticide Risks

According to the World Health Organization, more than 3 million people get sick and 220,000 die worldwide from pesticides each year. In the U.S. alone, pesticides poison 110,000 people each year. Experts believe that such incidents are greatly underreported, often being misdiagnosed.

High Risk Groups

Those at greatest risk of being adversely affected by pesticides include pregnant women and their fetuses, young children, the elderly, the chemically-sensitive, and those with other chronic health problems such as asthma, heart disease, liver and kidney problems, or compromised immune systems. Other factors such as small body size and genetics can increase ones vulnerability as well.

Safety Testing

- The very small amount of safety testing conducted on humans is done primarily on healthy young male adults, not on those who are most likely to show adverse effects from pesticide exposure. Moreover, these tests are typically done to assess acute effects, not the effects of low dose, chronic long-term exposure, which is much more widespread.

- The issue of synergism is likewise largely ignored in safety testing. Synergism is the process whereby the effects of exposure to 2 or more chemicals close to the same time can combine to greatly increase the toxic effect of either one (for example the combined exposure of a common ulcer medication and a common herbicide). Synergism can increase the toxicity of a pesticide by up to 4,000%.

- The small amount of safety testing that is required for a pesticide to be registered with the EPA primarily is done either by the manufacturers themselves or laboratories contracted by the manufacturers, not the EPA. This is clearly a case of the fox guarding the chicken coop! In fact, several large pesticide manufacturers have been indicted for falsifying safety data.

- The inadequacy of the present system for safety testing, registering, and regulating a pesticide has created a situation in which the public, in effect, is used as the final group of research subjects. We have seen, time and time again, commonly used pesticides previously claimed to be "safe" finally pulled off the market after decades of irrevocable harm having been done to people and the environment.

Chronic Low-dose exposure

- Low-dose, long term exposure to pesticides has been linked to various forms of cancer (breast, prostate, childhood leukemia, non-Hodgkin's lymphoma, and more) as well as to asthma, learning disorders, sleep problems, hyperactivity, mood disorders, and sensitization to chemicals and allergens.

Drift

- In a 2002 study, nearly half of the reported pesticide illness cases in California were the result of pesticide drift. **Every spray application of pesticides involves some degree of drift**. Drift from tree spraying can be significant and, once airborne, small droplets and vapor can travel for many miles.

- Studies done by the state of California found that air concentrations of pesticides peaked between 8 and 24 hours after pesticides were applied, with concentrations declining over several days to several weeks. As a result, for 45% of applications that were monitored, most drift occurred long after application. Clearly, unless there is a guarantee of no wind both during and for an extended period after application, there can be no guarantee of preventing off-site drift.

- Once a pesticide enters a home, either through open windows or various cracks and gaps, it then takes much longer to break down. For example, the half-life of carbaryl outdoors is an estimated 1-75 days, while indoors it is estimated at 120 days or more (at PH5 at 75^0F it can persist for up to 1500 days). At 120 days it would take 22 months for the carbaryl to degrade to 3% of its original toxicity.

Effect on non-target species

- Most pesticides are broad-spectrum in nature and simply cannot tell the difference between an unwanted pest and a beneficial insect, an endangered species, a beloved pet, or a human being. It is estimated that over 90% of applied pesticides never reach their target pests, but land, drift, leach, and runoff elsewhere risking harm to other species. Their use is, at best, only minimally effective in the overall control of pests, but can significantly reduce biodiversity in sensitive ecosystems, creating unintended and sometimes long-term imbalances. This is of particular concern regarding honeybees, which are highly sensitive to both carbaryl and permethrin. The bee population, upon which both our food supply and our native flora depend, is already in a state of alarming decline. Carbaryl is also toxic to predatory insects that feed on the Mountain Pine Beetle, creating the need for more future pesticide spraying.

Water contamination

- Since the escalation of the mountain pine beetle infestation in Colorado and the subsequent increase in tree spraying, carbaryl has been found contaminating municipal water supplies in Grand county as well as other areas. This not only poses a potential threat to human health, but one to fish as well. One study found low levels of carbaryl to be lethal to 100% of a sample population of aquatic stone flies, a primary food source for trout.

Safer Alternatives

1. Pheromone packets (Beetle Block^{tm})

    These contain verbenone, a synthetic pheromone. Hung in trees, they signal approaching beetles that these trees are already infested, and they go elsewhere. It is considered safe for people, pets, and the environment. It is applied in a grid pattern (not on every tree) of 20-50 packets per forested acre. The packets need to be placed on trees before the beetles fly in early summer. Beetle Block has been most successful when used as part of an overall plan to thin forests and remove infested trees, and when used in forests that are less than 20 percent infested (synthetic pesticides also begin to drop in efficacy as infestation levels increase). In 3-year tests in Montana, the packets successfully protected trees from MPB. In another study, mass attack was reduced to an average of 3.6 percent; in untreated areas, 48.3 percent of trees were mass attacked. In 2005 the Bark Beetle Technical Working Group, which consists of U.S. and Canadian entomologists, many of whom work for the U.S. Forest Service, state agencies, and various universities, stated that verbenone was effective in protecting trees in many instances from MPB.

Banff National Park (Canada) has an integrated MPB plan that uses no pesticides. Their policy;

1. Native insects and diseases are natural ecological processes that should be allowed to proceed without interference if possible.
2. Where insects or disease pose a serious threat to provincial lands, intervention may occur, provided that it is effective and **does not damage the park ecosystem.**

They successfully limit MPB damage by a combination of cutting, prescribed burning, and pheromones.

2. Preventive Land Management

- Minimize damage through thinning, promptly cutting and removing infected trees, and proactively replanting a diverse selection of disease-resistant, drought tolerant tree species.
- Water trees three to four times a month during the warmer months of spring and summer. Use a drip irrigation system or soaker hose (if legal where you live) to avoid wasting water. Place drip emitters away from the trunk of the tree, to better reach roots. Water at least once a month during the winter.
- Place a layer of mulch around the tree to cool the soil and conserve water, but keep mulch away from the trunk of the tree.
- Remove weeds and other competitive vegetation around trees to ensure efficient water usage.. To further conserve water, only apply during evening or early morning hours to avoid the heat of the day.
- Do not use nitrogen fertilizer; nitrogen fertilizer can increase tree stress; add a bit of calcium and manganese instead

3. Injectable, I.V. - delivered treatment (Arborjet^{tm})

A company is seeking approval in Colorado for a system that already has been approved and successfully used in other states. Although it does use toxic pesticides, its delivery system greatly reduces risk to the environment, kills both insect and larvae (sprays do not), is effective for up to 5 years from a single application, and eliminates the threat of drift altogether. It might be available in CO for next year.

4. Acceptance:

The consensus among experts, including U.S. and state forestry officials, Canadian forestry officials, and university researchers, is that the current MPB infestation is both a natural, recurring phenomenon and one that is unstoppable regardless of how much pesticide spraying is done. It is also generally agreed that the current heavy losses are due partly to decades of fire suppression resulting in overcrowded, weakened trees. Once the MPB problem has run its course our new forests eventually will be more diverse, more healthy, and more beautiful than ever.

Carbaryl, commonly used for MPB control, has already been banned in Austria, Angola, Germany, and Sweden, and increasingly restricted in many others due to concerns regarding excessive risk to human health and the environment. With the present system of pesticide use being described as a " Faustian bargain"---short-term gain at the expense of long-term tragedy, should we be risking the health of our families and our neighbors to fight an unwinnable battle against a natural process?

The answer to the problems associated with carbaryl use is not simply to choose different synthetic chemical pesticides. Permethrin, which is also commonly used to control the pine beetle, carries risks very similar to those of carbaryl. The toxicity of permethrin often is misrepresented by being described as merely a synthetic version of pyrethrum, a natural substance found in the chrysanthemum flower. In truth permethrin is a potent neurotoxin that, in chemical structure, bears a closer resemblance to DDT then it does to its natural precursor, pyrethrum.

Human health effects	**carbaryl**	**permethrin**
(some of these are seen at very low doses)		
neurotoxic	x	x
carcinogenic	x	x
mutagenic & teratogenic	x	
acetylchlorinestrase inhibition	x	x
endocrine disruption	x	suspected
immune system damage	x	x
kidney damage	x	x
liver damage	x	x
reproductive system damage	x	x
behavioral disturbances	x	x
harmful respiratory effects	x	
increased risk of heart attack	x	
sensitization	x	x
impairs thyroid gland	x	
impairs pituitary gland	x	
Environmental effects		
toxic to honeybees	x (highly!)	x
toxic to aquatic insects	x	x
toxic to fish	x	x
toxic to birds		x
found in groundwater	x	x
found in surface water	x	x
found in rain water	x	

Note on bifenthrin:

This is another pesticide that commonly is used on mountain pine beetles. There is far less safety data available for this chemical than for carbaryl or permethrin, particularly on human health effects. However, it is a synthetic pyrethroid, as is permethrin, and appears to have similar characteristics both in terms of its environmental fate and its health effects on wildlife and research animals.

Resources for safer products and services

Pheromone packets (Beetle Block): Need to be placed on trees in early summer before beetles fly ($ 15 each packet, quantity discounts available). Sold by:

1. Ag Bio 303-469-9221
- http://www.agbio-inc.com/page4/page26/psge26.html

2. Pherotech International 1-800-665-0076

Professional tree care advice; very experienced with MPB, **low impact tree removal** (they DO work in Boulder County, Gilpin County, and Jefferson County.

Sinclair Enterprises Phone: 970-509-9492; 970-887-9132 email: bob@sinclairent.com

Links to more information

From Beyond Pesticides/NCAMP:

1. Letter to cancel carbaryl and revoke all tolerances for it, from the Natural Resource Defense Council (NRDC). See links to the right of the listing for the active ingredient carbaryl.
2. Factsheets on carbaryl and permethrin
3. Well researched article on the issue of pesticide drift
- http://www.beyondpoesticides.org/gateway/

EPA Reregistration Eligibility Decision (RED) for carbaryl (2007) , which the EPA finally completed after having been sued by the NRDC (see www.nrdc.org/media/2007/070228.asp):
- www.epa.gov/oppsrrd1/REDs/carbaryl_red.pdf
- http://www.nrdc.org/media/2007/070228.asp

Factsheets on carbaryl and permethrin from the Northwest Coalition for Alternatives to Pesticides/NCAP:
- http://www.pesticide.org/carbaryl.pdf

Health Canada's fact sheet on carbaryl (1991)L which Health Canada says can last up to 1500 days:
- http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/carbaryl/index/e.html

Banff National Park of Canada: They are ONLY burning, thinning, taking out infested trees, and using pheromones:
- http://parcscanada.pch.gc.ca/pn-np/ab/banff/plan/plan14_E.asp

EPA Fact sheet on verbenone:
http://www.epa.gov/pesticides/biopesticides/ingredients/factsheets/factsheet_128986.htm

2005 Bark Beetle Technical Working Group:
- http://www.fs.fed.us/r6/f1d/pubsweb/bbtwg/bbtwg2005.pdf
- http://www.fs.fed.us/r6/f1d/pubsweb/bbtwg.shtml

Injectable IV-delivered treatment ($ 20 per tree, lasts 2 to 5 years)
- http://www.arborjet.com

Grand County's experience with carbaryl spraying
- http://www.grandcountywater.com

Article in the Nederland Mountain-Ear newspaper May 21st, 2009 "No Pesticides, please"
- http://www.themountainear.com

Article by Chris Weeber on Mountain Pine Beetles
- www.rmeha.org

Sources for this information

Primary sources for this information include the World Health Organization, EPA documents, manufacturer's materials safety data sheets (MSDS), various state and federal agencies, Canadian agencies, university studies, the National

Cancer Institute and other non-profit foundations, scientific journals, agricultural trade journals, and an article by Chris Weeber. Detailed references available from Heidi: email: handerson@epgr.com ; or Gunda: email: janooyen@me.com