

Sawdust harmful for your rodent or rabbit?

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Sawdust contains many toxic substances that make it totally unsuitable as ground cover for rodents and rabbits. Not only that, their carers also run health risks.

Introduction

In Europe, sawdust (wood chips, wood shavings) is largely made of coniferous wood (spruce and pine) that contains many toxic substances, including carcinogenic aromatic hydrocarbons (phenols) and abietic acid. The intensive contact of rodents and rabbits with their ground cover has major implications for their health and overall well-being. The various types of sawdust used in the Netherlands and available in shops were recently examined on the presence of the aforementioned substances by the Plant Research International in Wageningen. The results were nothing short of shocking (table 2). All the examined sawdust came from spruce and pine trees (table 1) and contained varying concentrations of abietic acid. This toxic substance causes hepatic impairment and liver diseases, respiratory problems (pneumonia) and increases the risk of cancer in rabbits and rodents that live in the vicinity of this type of sawdust.

What toxins are present in sawdust?

For many years, sawdust has been used by owners as satisfactory ground cover for their rodents and rabbits. It's cheap, often smells good and has natural insect repellent and disinfectant properties thanks to the aromatic compounds in the wood (especially coniferous wood). However, a 'natural' product does not always mean that it is harmless, on the contrary. The toxic substances released from the sawdust are harmful to the health of rodents and rabbits. One of the most toxic substances in sawdust is abietic acid, which, in various amounts, is present in almost all kinds of coniferous trees. Rodents and rabbits live in close vicinity with the ground cover, as a result of which the material has a major impact on the health and welfare of these animals.

Health problems are mainly caused by toxic substances such as abietic acid and other hydrocarbons (phenols) in sawdust. Most likely, small sawdust particles end up in the respiratory tract and damage the epithelium, causing the toxic substances to end up in the animal's bloodstream.

In rats, phenols cause an allergy-like reaction that promotes *Mycoplasma Pulmonis* related infections, which can make tame rats ill. In some cases, they even die after a short time. Looking closely, this is actually not an allergic reaction but an intoxication with phenols. The epithelium of the trachea and bronchi are damaged, causing viral and bacterial infections to strike easier. The toxic substance also enter the bloodstream and cause liver damage. After prolonged exposure to toxins from the sawdust, the damage to the liver will be virtually irreparable. The liver enzymes in the peripheral blood rise as a result of the liver damage and the immune system begins to weaken, making the rat extremely ill.

Various literature refers to health problems caused by abietic acid (and related substances) from coniferous trees.

1. Damage to the respiratory tract, especially the bronchial epithelial cells (Ayers, 1989, Vessel, 1967) and the tracheal epithelium in rats, including pneumonia (TeSelle, 1993).
2. Liver damage and diseases, including liver enlargement in mice who are kept in the vicinity of sawdust for extended periods of time (Odynets et. al, 1991), increase in the three liver enzymes (hexobarbital oxidase, aniline hydroxylase and ethyl morphine N-demethylase) in lab rats and -mice on sawdust with an extended induction time for anaesthesia (Vessel, 1967). These values returned back to normal after normal housing of rabbits on 'non-sawdust' ground covers in the form of cat litter (TeSelle).
3. Decrease in the 'sleeping time' after injection of barbiturates with 33% within 24 hours after placing the animal on sawdust and increase of liver enzymes in the blood. After 48 hours these symptoms were even stronger (Vessel, 1967)
4. Increase in tumours (Guide to the Care and Use of Laboratory Animals, 1996).
5. Weakened immune system and increased inflammation (Ducommun).
6. Skin and eye irritation (Stead, 1986).
7. Human exposure to Finnish pine wood caused contact dermatitis and urticaria, rhinitis, asthma, dyspnoea and conjunctivitis (Estlander, 2001).

The influence of toxic substances from sawdust on overall health has led to animal centres in the US no longer using sawdust (wood shavings) as ground cover. The Guidelines for the Care and Use of Laboratory Animals (1996) of the National Research Council (USA) also explicitly states that sawdust 'causes an increase in liver enzymes, the risk of cancer and cytotoxicity'.

Sawdust versus other ground covers

Sawdust (wood shavings, wood chips) is still used in large quantities by individuals and the 'average consumer' who has rodents and rabbits as pets. The ignorance of the health problems that sawdust causes among many veterinarians, pet shop owners and pet lovers is probably to blame.

Reasons to continue using sawdust are familiarity, wide availability, lower price compared to alternatives and the 'pine scent' that is considered pleasant compared to the less pleasant odours that rodents and rats sometimes spread.

The Council of Europe also recognises the importance of proper ground cover. When speaking of the protection of animals (86/609/EEC) used for experimental and other scientific purposes, in article 3.9 on ground cover / litter they state that '*ground cover should be dry, absorbent, dust-free, non-toxic, free of infectious microorganisms, pests or any other form of contamination*'. *Generally speaking, it is highly recommended to avoid sawdust or bedding material from wood that has been chemically treated. Sometimes certain industrial by-products or waste products are used (such as shredded paper)*".

It is the responsibility of veterinarians and pet shops to properly inform (potential) owners of rodents and rabbits. Moreover, magazines on 'small livestock and hobby animals' should also pay attention to this issue.

Alternatives for sawdust from coniferous trees as ground cover free of toxic substances for rodents and rabbit include:

- Cat granules (dust-free).
- Shredded paper (preferably plain) or newspapers (may include toxic ink).
- Cotton products (No Smell).
- Ground corn cores (Corbo).
- Sawdust from other types of wood (such as poplars) free of toxic substances (Care-fresh).
- Pressed pellets of wood fibre (deciduous trees, sometimes sharp edges) or compressed paper.
- Paper strips (preferably without ink).

Conclusion:

Sawdust (wood chips) made of coniferous trees are absolutely not suitable as ground cover for rodents and rabbits. The health risks are unacceptably high. They make the animals in their vicinity sick and weaken their resistance against infections and tumours. In other words, keeping animals on coniferous tree sawdust is actually animal cruelty. Through a wide-ranging information campaign, owners of rabbits and rodents can be made aware of the harmful effects of sawdust.

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Annex / Tables

Results lab research Wageningen Plant Research International.

Wood shavings analysis: June 2005 distinction coniferous trees and deciduous trees
Composition 5 samples from 5 major brands in The Netherlands from the 'Dierenspecialzaak'
taken from two batches per manufacturer, bought in two different stores. Per batch, 25 'wood
particles' were examined under a microscope.

Table 1:

Difference between coniferous and deciduous wood can be made on the basis of whether
there are vessel elements present.

	Coniferous wood (no vessel elements)	deciduous wood (vessel elements)
1a	24	1
1b	25	0
2a	25	0
2b	25	0
3a	25	0
3b	25	0
4a	25	0
4b	25	0
5a	25	0
5b	25	0

Conclusion: the researched sawdust contains almost exclusively coniferous wood!

Table 2

Determining the presence of abietic acid in wood chips, quantitative method (chromatogram
in combination with mass spectrum).

Concentration abietic acid in mg/gram wood chips.

Specified as the average of three measurements of each type of sawdust and standard
deviation (sd).

Sample No.	avg. conc. abietic acid	sd
1	1.50	0.26
2	0.93	0.05
3	2.00	0.21
4	0.88	0.05
5	0.18	0.01

Conclusion:

In addition to a large number of chemical compounds (some of which are related to abietic
acid), all researched sawdust / wood chip samples contain abietic acid. Several volatile
compounds were observed in the air above the sawdust, including monoterpenes (including
alpha-terpineol).

In literature on the subject, abietic acid is a well-known cause of health problems in rabbits and rodents. Sawdust and wood chips of coniferous trees (spruce and pine) contains abietic acid and is therefore not suitable as ground cover for rabbits and rodents.