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Provincia di Milano

IZSLER

# WILD MUSHROOMS: FOOD POISONING PREVENTION GUIDE

Amanita phalloides - (Foto da "*Funghi velenosi*" Ed. dalla Natura)

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# WILD MUSHROOMS: FOOD POISONING PREVENTION GUIDE

## more knowledge, more safety

Mushroom intoxications were and still are an ongoing risk: knowledge and use of a few simple suggestions will allow safe consumption of these delicious "fruits of the earth".

**Eat wild mushrooms only if they have been checked by a professional mycologist!**

*This publication, a very valuable tool for preventive healthcare, was realised, by Poison Control Centre of Milan, in collaboration with the Italian Ministry of Health and the Institute Zooprofilattico of Lombardy and Emilia Romagna.*

*Mushroom world is fantastic and fascinating, but it can turn into a "nightmare" for the ingestion of toxic, poisonous and deadly species.*

*The brochure provides some simple, strong and direct indications, also through pictures of dangerous mushrooms, to warn citizens, collectors and consumers from eating uncontrolled species. Every year there are fatal cases due to very poisonous mushrooms, so it's essential to inform and deliver insight a fascinating matter as "mycology" to prevent health damage.*

*The picked up mushrooms should be firstly checked by a mycologist. This can be done at a Mycological Inspectorate, established at the Service of Food Hygiene and Nutrition (SIAN) of ASL. Storage, cooking and consumption require some precautions and methods that must be implemented in order to prevent dangerous habits. Finally the brochure lists the major toxic syndromes and their symptoms, for a safe consume of this tasty and delicious food*

*The Authors*

# What are mushrooms?

Photo: S. Balestreri

Mushrooms are quite complex organisms essential for the ecology of variety of natural environments; they do not have chlorophyll, so they must collect glycogen and other substances elaborated by other living beings (saprophytes, parasites or symbionts).
What we call mushroom is just the "fruiting body" (carpophores) of a more complex organism (the mycelium) consisting of a mass of branching tread like hyphae. This vegetative complex is present in the soil, under the bark of trees or in other different environments, throughout the whole year.
Mushrooms grow almost anywhere, but the ideal habitat is the forest and they play a key role in the ecosystem. These "fruits" have different shapes, colours and sizes; thanks to their reproductive system (via spores) they allow for the continuity of the vital cycle.

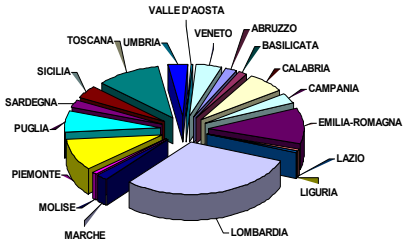
## Norms of behaviour in collecting and transporting wild mushrums

Photo: S. Balestreri

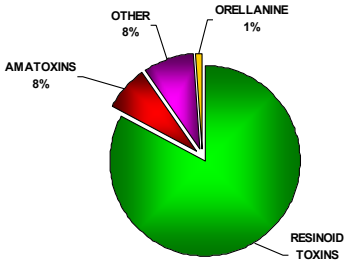
The harvest is regulated by a national law (352/1993) which specifies:
- A maximum limit on collection.
- Not to use rakes or other tools that could seriously damage the entire fungal productive apparatus.
- Mushroom must be picked up whole, detached from the mycelium with a twisting movement and uncut. This allows a more accurate determination of the species.
- Not to collect mushrooms that are too young or in too bad of a condition,
- The harvest should be stored in containers which allow the spread of spores. It is best to avoid the use of plastic bags anyway, because they accelerate the decomposition of fungi.
- Not to destroy the specimens that are considered poisonous as they are useful for the forest life.

# Poison Control Centre of Milan and poisoning by mushrooms

The Poison Control Centre of Milan, from 1994-2014 received 17.311 requests for advice about mushrooms poisoning; the actual number of cases is certainly greater because usually not all the poisoned diners contact the PCC in Milan.The symptoms of the ingestion of poisonous or not edible mushrooms are various and related to the involved fungal species. In some serious cases, the liver suffers irreparable damage so the organ transplantation (21 cases), when possible, is necessary.
The reported deaths (46 patients) should prompt the consumers not to risk their life or severe injury and to consume only mushrooms inspected by a specialist!




GEOGRAPHIC PROVENIENCE OF CALLS




TOXINS INVOLVED

In case of symptoms after ingestion of unchecked mushrooms, contact a Poison Control Centre (PCC) or the nearest emergency department.
To consume the harvest safely you may contact the Mycological Inspectorate ASL of your area, where an expert will provide you information about the edibility and the type of cooking required for each fungal species.

### Clinical Cases: Milan PCC (2004-2014)

| POISONING BY MUSHROOMS | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | TOT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL CALLS | 884 | 1072 | 866 | 643 | 709 | 835 | 843 | 477 | 930 | 780 | 705 | 8.743 |
| CLINICAL CASES | 750 | 853 | 710 | 504 | 591 | 697 | 646 | 364 | 741 | 647 | 554 | 7.061 |
| LONG LATENCY | 205 | 233 | 204 | 145 | 116 | 172 | 138 | 64 | 138 | 130 | 106 | 1.651 |
| SHORT LATENCY | 487 | 534 | 444 | 288 | 376 | 465 | 403 | 249 | 488 | 456 | 371 | 4.561 |
| OTHERS (*) | 58 | 86 | 62 | 71 | 99 | 60 | 105 | 51 | 115 | 61 | 77 | 849 |
| INFORMATION BY FOLLOW-UP CALLS | 134 | 219 | 156 | 139 | 118 | 137 | 192 | 113 | 189 | 133 | 151 | 1.682 |
| DEATHS | 2 | 1 | 4 | 3 | 1 | 1 | 6 | 0 | 1 | 2 | 2 | 23 |
| TRANSLPLANTS | 1 | 0 | 2 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 10 |

# POISONING BY INGESTION OF TOXIC MUSHROOMS

Photo: S. Vianello

THE AMOUNT OF TIME ELAPSED BETWEEN INGESTION OF TOXIC MUSHROOMS AND THE FIRST ONSET OF SYMPTOMS DETERMINES:

Photo: S. Vianello

## SHORT LATENCY SYNDROMES

Symptoms appear from 30 min to 6 hours after the ingestion and generally go away within about 24 hours:

**REDUCED RISK FOR LIFE**

**Gastrointestinal syndrome** (nausea, vomiting, diarrhoea, abdominal pain, dehydration)
**Pantherinic syndrome** (drowsiness, agitation, disorientation, convulsions)

**Muscarinic syndrome** (sweating, watery eyes, hypotension, difficulty of breathing)

**Psychotropic syndrome** (hallucinations)

**Coprinic syndrome** (in combination with alcohol: skin rash, agitation, hypotension)

**Paxillic syndrome** (repeated ingestions, hemolytic anemia)

**Nephrotoxic syndrome** (transient renal failure)

## LONG LATENCY SYNDROMES

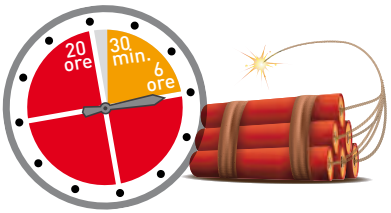
Symptoms appear from 6 to 20 hours after ingestion:

**HIGH RISK FOR LIFE**

**Phalloideas syndrome** (repeated episodes of vomiting and diarrhoea, acute hepatitis with possible need of transplant. It is potentially lethal)

**Orellanic syndrome** (renal failure with need of dialysis or transplant)

**Gyromitric syndrome** (drowsiness, agitation, seizures, muscle contractions, hemolytic anemia, hepatorenal damage)




## SHORT LATENCY SYNDROMES

• **The Gastrointestinal syndrome** is the most common one, caused by many fungal species (mostly *Entoloma lividum, Russula emetica, Boletus satanas* etc..). The active molecules responsible are many and not always known. Symptoms already appear at the end of the meal or within 3-4 hours and are proportional to the amount of ingested mushrooms; vomiting, diarrhoea and abdominal pain subside spontaneously within 24-48 hours; often is necessary to reintegrate the water losses.

• **Pantherinic syndrome** is especially due to *Amanita muscaria* and *Amanita pantherina*. The clinical picture, in relation to the amount of ingested toxins

(ibotenic acid, muscimol and muscazone), goes from dizziness, unsteadiness, euphoria, tremors, confusion, to convulsions followed by hallucinations and drowsiness.

• **Muscarinic syndrome** is due to muscarine (found in Amanita muscaria), but present in greater quantity in Clitocybe and Inocybe. It is characterized by a peculiar clinical picture: headache, abdominal pain, hypersalivation, strong sweating, lacrimation, tremors and bradycardia that appear from 15 to 60 minutes after the intake. Therapy, in addition to the gastric decontamination, involves the use of atropine.

• **Psicodisleptic syndrome** is connected to the genera *Psilocybe, Panaeolus, Stropharia* that have properties similar to LSD. The symptoms appear within 1 hour after ingestion and are characterized by visual perception anomalies, distortion of colours and shape perception and disorientation, agitation, and aggressive behavior.

• *Coprinus atramentarius produces a toxin* that interacts with ethanol and determines the **Coprinic syndrome**, which is characterized by cutaneous vasodilatation, hypotension, tachycardia and headache; the treatment is symptomatic. The symptoms of the short latency syndromes last from 6 to 24 hours, and if not serious, they regress with the use of reliever medications.

## LONG LATENCY SYNDROMES

This mushrooms intoxication is quite different, because it is associated with a higher mortality rate, can occur after more than 6 hours ingestion (8-12); symptoms can mimic a gastroenteritis similar to a common flu. It is possible that both patients and doctors underestimate the risk, so a delayed hospitalisation can bring to an irreparably compromised health status.

- The most common one is the **Phalloides syndrome**, whose toxicity is related to the presence of amatoxine. Just a single cap (approximately 20 grams), is sufficient to cause severe intoxications; poisoning is characterized by frequent episodes of vomiting and diarrhea that quickly lead to a severe state of dehydration and electrolyte imbalance.
  The target organ is the liver, protein synthesis is blocked (by inhibition of RNA polymerase II) and it is followed by cell death; damage can lead to transplantation or death.
  All cases of gastroenteritis which appear after ingestion of unchecked mushrooms, with a latency greater than 6 hours, should be treated as soon as possible with decontamination (gastric lavage, multiple doses of activated charcoal) and with an infusion of fluids, keeping in mind that the earlier the therapy is started the better the outcome will be.
- **Orellanic syndrome** is caused by fungi of the genus *Cortinarius orellanus* and *speciosissimus* and may not lead to gastrointestinal manifestations, but after 36 hours (sometimes at day or week long intervals) muscle aches, headache,

chills and loss of appetite can occur, followed by a reduction of the amount of urine. The escalation towards renal failure is possible and can often be irreversible. For this kind of poisoning, the only available therapy is dialysis during the period of renal suffering and kidney transplantation is necessary in case of irreversible renal failure.

- **Gyromitric syndrome** is rare and is characterized by drowsiness, muscle spasms, haemolytic anaemia, liver and kidney damage after repeated ingestions of considerable amounts of mushrooms.

## SHORT LATENCY SYNDROMES: RESPONSIBLE SPECIES

*Amanita pantherina* S. Vianello

*Amanita muscaria* M. Floriani

## SHORT LATENCY SYNDROMES: RESPONSIBLE SPECIES

*Russula emetica* G. Materozzi

*Boletus satanas* R. Mazza

*Agaricus xanthoderma* G. Materozzi

*Tricholoma pardinum* G. Materozzi

*Entoloma lividum* G. Materozzi

*Omphalotus olearius* R. Galli

## SHORT LATENCY SYNDROMES: RESPONSIBLE SPECIES

*Lactarius torminosus* S. Vianello

*Hypholoma fasciculare* G. Materozzi

*Inocybe fastigiata* S. Vianello

*Clitocybe dealbata* G. Materozzi

*Clitocybe cerussata* G. Materozzi

*Psilocybe moravica* R. Galli

*Clitocybe nebularis* G. Materozzi

*Coprinus atramentarius* G. Materozzi

## LONG LATENCY SYNDROMES: RESPONSIBLE SPECIES

*Amanita phalloides* M. Verzolla

*Ovulo Amanita phalloides* G.Materozzi

*Ovulo Amanita caesarea* R.Galli/M. Ianniello

*Amanita verna* R. Galli

*Amanita phalloides* R. Galli

*Amanita virosa* R. Galli

## LONG LATENCY SYNDROMES: RESPONSIBLE SPECIES

*Galerina marginata* F. Calledda

*Lepiota josserandii* R. Galli

*Cortinarius orellanus* M. Floriani

*Cortinarius speciosissimus* M. Floriani

*Gyromitra esculenta* F. Calledda

*Gyromitra fastigiata* F. Calledda

# MUSHROOMS: DON'T TAKE RISKS, LEARN TO KNOW THEM

## MUSHROOMS ARE A LETHAL DANGER

None of the traditional methods can be used to exclude mushrooms toxicity

### EDIBLE MUSHROOMS CAN CAUSE HEALTH PROBLEMS:

- rotten mushrooms
- infested mushrooms
- individual tolerance

### "Debunking Myths" It is not true that:

- Mushrooms grown on trees are not toxic.
- Mushrooms eaten by parasites are always edible.
- Mushrooms, grown close to rusty iron, become poisonous.
- Toxic Mushrooms change colour when they are cut.
- The poisonousness of a fungus is given by its appearance.

*Armillaria mellea* G. Materozzi

### *Armillaria mellea*

Vomiting, Diarrhea, Abdominal pains

- Stipes ingestion
- Insufficient cooking time

### SPECIES TO BE CONSUMED WELL COOKED:

- *Boletus luridus*
- *Clitocybe nebularis*
- *Amanita rubescens*
- *Amanita vaginata*

*manita vaginata* G. Materozzi

*Boletus luridus* G. Materozzi

# MUSHROOMS: FOLLOWING THE RULES CAN SAVE YOUR LIFE

## "GOLDEN RULES FOR AVOIDING MUSHROOMS INTOXICATION"

1. Consume only mushrooms controlled by a trusted mycologist.
2. Consume small amounts.
3. Never give them to children.
4. Do not ingest them during pregnancy.
5. Eat mushrooms only in a perfect state of preservation.
6. Eat well-cooked mushrooms and chew them properly.
7. Lightly boil the mushrooms before freezing and consume within six months.
8. Do not eat mushrooms picked along the roads near industrial and crop growing areas (due to pesticides).
9. Give the mushrooms you gathered to your friends only if they have been checked by a professional mycologist.
10. Botulinum toxin can develop in mushrooms packed in oil.

## WATCH OUT FOR


*Amanita caesarea*


*Amanita muscaria*


*Pholiota mutabilis*


*Galerina marginata*

Da: **Funghi commestibili e velenosi a confronto** - R. Mazza, Fabbri editori

## DELICIOUS BUT ALSO DANGEROUS MUSHROOMS

For their safety, mushrooms consumers should take some precautions when purchasing (buying only ones with the mycological check label!), transporting (no plastic bags), cooking and eating mushrooms.

"REMEMBER THAT...."

- The toxins responsible for the most severe syndromes are resistant to boiling and drying.
- The simultaneous intake of different fungal species can cause different syndromes.
- Uncooked specimens and biological fluids are used for determining species responsible for intoxication.

Never eat wild unchecked mushrooms!
The examination by a NSH Mycologist is free!

**Only a professional mycologist can ensure the edibility of wild mushrooms .**

Photo: F. Magonio

**Having the mushrooms checked can save your life: more control, less rissk for your health!**

# MUSHROOMS INTOXICATIONS, WHAT SHOULD I DO?

**CRITERIA FOR HIGH SUSPECTED POISONING BY MUSHROOMS**

Draw: R. Mazza

- CONSUMPTION OF UNCHECKED MUSHROOMS!!
- GASTRO ENTERIC SYNDROME AFTER INGESTION OF MUSHROOMS

If after ingestion of **CHECKED** mushrooms any symptoms arise,

ASK THE DOCTOR

**DO NOT TRY TO TREAT YOURSELF...**

**MILK IS NOT AN ANTIDOTE!**

## POISONING FROM MUSHROOMS NOT CONTROLLED

**If, following ingestion, any symptoms arise,** GO TO THE E.R.!

Bring along any leftovers of mushrooms (cooked, raw, remains of cleaning).
If other people have consumed the same meal, contact them immediately and send them to the E.R..

There is no antidote able to fight the toxic action of poisonous mushrooms.


E' morto il bambino avvelenato dai funghi

Ecco i quattro «portatori di morte» i sintomi del male e le cure possibili

«Sono sette o sette le vittime dei funghi»

Le somiglianze che uccidono

I funghi avvelenati Tre sotto inchiesta

Funghi: uccisi altri due bimbi

ALTRI TRE MORTI E 15 AVVELENATI DA FUNGHI RACCOLTI NEI BOSCHI

Attenti al fungo killer è riapparso nei boschi

Un pugno di funghi ha ucciso 4 persone

Avvelenata dai funghi

«Attenti al killer, viene dal bosco»

I funghi avvelenati Tre sotto inchiesta

Photo: S. Balestreri

Remains of cooked mushrooms: the test sample for intoxication.

## INTOXICATIONS BY MUSHROOMS: THERAPY

1. DECONTAMINATION (Gastric lavage, activated charcoal)
2. HYPERHYDRATATION (EV fluid therapy with the aim of rebalancing loss of water and salts due to vomiting and diarrhea)
3. SUPPORTIVE AND SYMPTOMATIC TREATMENT

**In *Amanita phalloides* poisoning , the real life-saver is the early diagnosis and an appropriate medical intervention**
**THERE IS NO CURRENTLY KNOWN ANTIDOTE OF WHICH EFFECTIVENESS HAS BEEN DEMONSTRATED**

## MUSHROOMS INTOXICATIONS PILLS

### WHAT SHOULD YOU DO

Consume only mushrooms that have been checked by a professional mycologist! Always save an uncooked specimen for the identification in case of symptoms. Contact your doctor immediately: treatment, if promptly applied, can save your life.

### TREATMENTS

There is no antidote able to counteract the deadly toxins. You must remove them from the body as soon as possible: in case of illness due to the ingestion of unchecked mushrooms, go to the ER

- **GASTRIC LAVAGE:** washes away the residue of the meal from the stomach through a tube, in attempt to reduce the amount of ingested toxins.
- **ACTIVATED CHARCOAL:** it is administered immediately after the stomach emptying, and prevents the absorption of residual toxins and elimination through the faeces.
- **INTRAVENOUS THERAPY:** infusion of fluids is necessary for restoring water loss and salts due to vomiting and diarrhoea.

In case of intoxication by *Amanita phalloides* and *Cortinarius orellanus*, a liver or kidney transplantation, respectively, may be unavoidable.

**You can contact a Poison Control Centre for toxicological information, 24 hours a day.**

## STORAGE

**Before proceeding to the preservation of fresh mushrooms, make sure they are definitely edible (certification), healthy and well cleaned!**

**DRIED MUSHROOMS:** Carrefully remove the soil residue then, without washing, slice and let them dry (with sun light, drier etc..) on a clean cloth and store in a cool, dry place.

**FROZEN:** Choose young and not too big mushrooms. If conservation in the home freezer unit is planned, it is advisable to lightly boil them beforehand

**IN OIL:** Boil them for about 20 minutes in a solution made of 2/3 vinegar and 1/3 water (botulism hazard!). Drain and dry before putting them into jars with olive oil.

## WHAT IS BOTULINUM?

The Clostridium botulinum, Gram+ germ, sporogenous, anaerobic, causes a characteristic syndrome due to a neurotoxin, known as botulism. Botulism is caused by toxins produced by spores present in foods stored under vacuum, or oil, in home made sausages and salami; the acidic environment (pH <4), the addition of brine or sugar, drying, and prolonged boiling are useful to prevent the germination of the spores.
The toxins cause descending muscular paralysis, which may lead to severe respiratory failure.
Clinical manifestations may occur with a latency period of 24-48 hours (sometimes more than 10 days) after the ingestion of contaminated food. Typically, the earlier the onset of symptoms, the worse the prognosis. The initial gastrointestinal symptoms, sometimes softened, are accompanied by tiredness, fatigue and dizziness and later followed by blurred vision (diplopia), abnormal intolerance to light, difficulty of swallowing (dysphagia) and talking (dysarthria).

**DIAGNOSIS:** It is not always simple. If the clinical pictures are blurred, it starts with the research of the toxin in the patient's serum and faeces and in the implicated foods through the neutralization test of the toxin with antitoxin on a guinea pig (48 hours) and through examination of cultures that take 5 to 7 days.

**TREATMENT:** support of breathing and serum therapy antidote.
The patient poisoned by botulinum toxin maintains sensitivity and awareness; in serious cases, recovery can be very slow and may require months.

## FOOD BOTULISM

- Food involved
  – Canned vegetables packed in oil
  – Long shelf life products packed in oil or in vacuum non-heat-treated and with acidity more than pH 4.6.
- Precautions
  - Wash vegetables accurately and boil in a solution made of vinegar and water before putting them under oil
  - Sterilize the containers carefully before use

# USEFULL INFORMATIONS

## HELPFUL TIPS FOR GATHERERS

• Avoid the indiscriminate gathering of all mushrooms, this will cause damage to the ecosystem. Furthermore, only a restricted number of species are edible;
• The mushrooms should be collected whole and not damaged .
• The gathered mushrooms have to be transported in stiff and aerated containers (eg. wicker baskets) that allow an additional dissemination of spores. Furthermore, avoiding compression and fermentation harvest you can prevent a serious poisoning.
• Do not trust the naïve "experts"; all collected mushrooms should be checked only by NSH Mycological Inspectors (the service is free of charge!)

## TIPS FOR THE CONSUMER

• There are no empirical methods (such as tests with garlic, silver coins, etc..) for checking if a mushroom is edible or poisonous.
• Cooking, drying or other methods do not change poisonous mushrooms in less deadly ones (Amanita phalloides and others).
• All mushrooms must be eaten well cooked. Raw mushrooms are barely digestible, sometimes even poisonous: for example the common "honey fungus" Armillaria mellea, is toxic if pre boiling and elimination of the cooking water is not performed at least 15-20 minutes before the final cooking
• MUSHROOMS ARE NOT RECOMMENDED for children, pregnant women, people who show intolerance to particular drugs and people with specific diseases.

## ADVICE FOR WHO WANTS TO BUY FRESH SPONTANEOUS MUSHROOMS AT THE SHOP

• Before buying make sure that the box or packaging, containing the mushrooms is marked with a label certifying the mycological check by the Inspectorates of NSH. If there is no inspection card, it is recommended not to buy the product and report the issue to the authorities involved in food control.

# APPENDIX

## 1. Poison Control Centre

Poison Control Centres are National reference points for both healthcare professionals and citizen.

They provide toxicological advice for diagnosis and treatment of all intoxications caused by any substance (drugs, household products, food, etc.).

In addition, the PCC of Milan (certified ISO 9001 since December 15, 2003) constantly collaborates to spread and review protocols for treating intoxications.

Besides research and teaching, the PCC has the task of preventing unintentional poisonings, through training and divulgative courses for both health care personnel and private.

If Amanita phalloides intossication is suspected, the PCC follows to clinical course recommends a protocol treatment, which indicates the most appropriate diagnostic and therapeutic procedures.

The PCC follows the clinical Course and the management of poisoned patients.

## 2. Role and competences of NSH Mycological inspectorates

The public Mycological Inspectorates are Local Units of Health national service, and are organized by the Regions as outlined by the Presidential Decree 376/95.

They are directly related to the Food and Nutrition Health Service and their most important function is the official control of fungi in the public and private sectors.

Concerning the gathering and consumption of wild mushrooms, the Mycological Inspectorates are responsible for:

- The recognition and identification of fungal species harvested by privates.
- Consultancy for hospitals and other emergency units in case of poisoning.

The services provided are free of charge.

## 3. Experimental Zooprophylactic Institute

The "Food Microbiology" laboratories in Brescia identify the parasites that can infest food, search for viral agents and GMOs (Genetically Modified Organisms).

The chemical analyses conducted by the Institute are performed at the head office and at the Department of Environmental Contaminants, the Department of Food Chemistry and Technology for Humans, and the Laboratory of Food Chemistry diagnostics section of Milan; these are subdivided into various specialized laboratories and, in some peripheral sections, a specific department for animal products is active.

The Institute's policy in support of food safety, in order to effectively protect this kind of industry, is not only directed to the authorities but also to the primary production and the transformation areas.

Therefore, it has recently been established a Department of Epidemiological Surveillance of livestock, destined to become the filter in the development of " Risk Systems Analysis of food chains" which will implement the information system of the Institute's epidemiological observers.

Poison Control Centre of Milan (PCC) 02/66101029
www.centroantiveleni.org

• Other PCC (salute.gov.it)
http://goo.gl/R7yoes

• Inspectorate of Mycology: (salute.gov.it) -
http://goo.gl/SzUaJd

• Food and nutrition safety Service (S.I.A.N.) of ASL
SIAN Milan: 02/85789768 - 02/85789764
• IZSLER BS Telefono 030/22901
(wwwizsler.it)

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# INDEX


Boletus pinophilus - (Foto Stefano Balestreri)

*"fungus qualiscumque sit,*
*semper malignus est"*

(Seneca)