

Many mushroom poisoning cases reported in 2022

Every year, foraging for wild mushrooms leads to more than a thousand cases of poisoning, some of which can be fatal. In 2022, many more poisoning cases were reported than in previous years. A specific data collection questionnaire was developed to gain a better understanding of the reasons behind these cases. The results show that the fungi in question were mainly picked in woodlands, with Satan's boletes and yellow stainers topping the list of identification errors. Nearly 40 serious cases occurred in 2022, including two deaths. ANSES has reiterated its recommendations on good foraging practices to be followed to prevent poisoning.



In France, more than 3000 species of "higher" fungi or macromycetes have been documented. Although many people enjoy eating wild mushrooms, some species are nevertheless toxic or even fatal to humans. Every year, more than a thousand cases of mushroom poisoning are recorded by the poison control centre (PCC) network in France. Of these, an average of 30 are very serious and three result in death.

Since 2016, ANSES has been monitoring these poisoning cases from July to December, as most mushrooms grow in summer and autumn. Prevention messages are relayed by the national and local media to coincide with the period when the number of poisoning cases tends to rise.

Many poisoning cases in 2022, as in 2019

For the 2022 season, 1923 symptomatic poisoning cases were reported to PCCs during the monitoring period between 1 July and 31 December 2022. This number was higher than in previous years (typically around 1300 cases per year) and roughly the same as in 2019 (2025 cases), when the number of poisonings was the highest since 2016.

Mushroom growth varies from one year to the next depending on various factors such as precipitation and sunshine. The monthly peak for poisoning in 2022 occurred in October, as in five of the last six years of monitoring.

A specific questionnaire to find out more about the poisoning circumstances

The numerous risk factors for mushroom poisoning include poor storage (for example, plastic bags encourage bacterial growth), consumption of old specimens in poor condition, mushrooms that are undercooked or eaten in excessive quantities, and a consumer's individual sensitivity. However, the main risk still comes from confusion of an edible species with a toxic one.

A specific data collection questionnaire was introduced by the PCCs for the 2022 monitoring period. It was proposed to each person calling a PCC about mushroom poisoning in a food context, in order to systematically collect additional data on how the mushrooms were obtained, the type of mushrooms sought by the picker, the method of identification, and their awareness of ANSES's prevention messages.

Of the 1923 cases reported to the PCC in 2022, 1862 concerned people who had been poisoned during a meal containing mushrooms. The other cases involved accidental ingestion by young children (41 cases in children under 10 years of age) or adults with mental disorders (20 cases), who had eaten mushrooms found in a garden, playground or forest without the knowledge of their parents or carers. These cases are not detailed below.

The poisoning cases were linked to 1371 meals, whether shared or not. In 58.5% of cases (771 meals) only one person was poisoned, while in 41.6% of cases (545 meals) several people (at least two symptomatic individuals) were affected.

Mushrooms mostly found in woodland

Information on the origin of the mushrooms was available for 1146 meals (87%). They had mostly been foraged (92.8% of meals) rather than purchased in a supermarket, market or greengrocer (5.3%), or eaten in a restaurant (1.8%). In 76.9% of cases, they were picked by the poisoning victims themselves, and to a lesser extent by third parties (22.6%) such as friends or neighbours. Foraging took place mainly in woodland (52.5% of cases) and less frequently in a garden (15.5%). Although not recommended, 2.8% of mushrooms had been picked by the roadside.

Table 1 : Monthly breakdown of accidental mushroom poisoning cases observed by poison control centres between 2016 and 2022, from 1 July to 31 December. The worst-affected month of the year is shown in blue (Source: SICAP).

	2016	2017	2018	2019	2020	2021	2022
July	18	87	38	24	51	174	93
August	29	182	125	193	48	147	33
September	38	493	221	124	195	132	380
October	271	529	293	1157	764	603	1018
November	232	64	368	404	267	223	307
December	19	31	80	123	40	61	92
Total	607	1386	1125	2025	1365	1340	1923

Table 2 : Origin of the mushrooms (Source : SICAP).

	Number of meals	%
Picked by an individual	1064	92.8
Picker		
<i>Poisoning victim</i>	818	76.9
<i>A third party</i>	231	21.7
<i>Not specified</i>	15	1.4
Picking location		
<i>Woodland</i>	555	52.2
<i>Garden</i>	165	15.5
<i>Roadside</i>	30	2.8
<i>Don't know</i>	314	29.5
Purchased	61	5.1
Place of purchase		
<i>Greengrocer or supermarket</i>	34	55.7
<i>Market</i>	17	27.9
<i>Mushroom farm</i>	2	3.3
<i>Don't know</i>	8	13.1
Type of mushroom purchased		
<i>Cultivated</i>	19	31.2
<i>Wild</i>	2	3.8
<i>Don't know</i>	40	65.6
Form of mushroom purchased		
<i>Fresh</i>	23	39.3
<i>Dried</i>	24	18.0
<i>Frozen</i>	3	4.9
<i>Don't know</i>	23	37.7
Consumed in a restaurant/obtained from a caterer	21	1.8
<i>Total</i>	1146	100

The purchased mushrooms mainly came from a greengrocer/supermarket (55.7% of meals), or from a market (27.9%).

These purchased mushrooms were mainly cultivated varieties (31.2% of meals), mostly sold fresh (39.3% of meals) or dried (18.0% of meals).

The most sought-after species (not necessarily the ones actually picked) were ceps (27.2%), *Lepiota* (19.9%), boletes (18.4%), *Agaricus* (17.3%), fairy ring mushrooms (5.3%), girolles (5.0%) and chanterelles (3.9%).

When picking the mushrooms, some people tried to identify them prior to consumption using various means such as books, smartphone apps or the internet, or with the help of a third party, pharmacist or mycologist belonging to an association. This information on the attempt to identify the picked mushrooms was available for 660 meals (62.0%). A quarter of the mushrooms had been identified: by a third party in almost half of these cases, by a professional (pharmacist, mycologist) in 24% of cases, or using a smartphone app in 10.5% of cases.

Satan's boletes and yellow stainers responsible for most cases of mistaken identity

Since 2014, thanks to the national "Mycoliste" network linking PCCs and mycology experts, any fungi suspected of causing poisonings for which a PCC was contacted can now be identified, when the necessary information is provided (photographs, description, etc.). This rapid identification enables the PCCs' toxicologists to adapt patient treatment.

In almost half the cases, the collected mushrooms subsequently identified by a Mycoliste mycologist (n = 377) included one or more toxic species. The most frequently identified were Satan's boletes (24.7%), yellow stainers (21.5%), *Entoloma sinuatum* (10.5%), *Macrolepiota venenata* (7.7%), Jack o'lanterns (7.3%) and fly agarics (5.7%).

Table IV shows the most common confusions, when information was available from the Mycoliste network on the species initially sought and on identification of the fungi actually picked.

Most of the mushrooms were eaten fresh (669 meals) and pan-fried (750 meals). Although not recommended, wild mushrooms had been eaten raw in 94 meals.

Poisonings may be benign, but can sometimes be fatal

Poisoning victims mainly suffered from digestive symptoms (1736 people, or 93.2%), and presented with at least one sign of vomiting, nausea, diarrhoea or abdominal pain. Neurological signs were also observed in 17.1% of patients (dizziness, headaches, tremors) and general signs in 10.5% (asthaenia, discomfort, hyperthermia).

Lastly, some people had dermal symptoms (7.5%), mainly excessive perspiration, skin rash or pruritus, as well as cardiovascular symptoms (4.4%) such as hypotension or tachycardia

Although there were more poisoning cases in 2022 than in previous years, the number of very serious cases was no higher (37, or 1.8%).

Most patients involved in the serious cases had amanita poisoning¹ (48.6%), followed to a lesser extent by pantherina syndrome² (21.6%) and sudorian syndrome³ (10.8%).

Two people had both pantherina syndrome and sudorian syndrome, and one person had amanita poisoning and orellanine syndrome. In 10.8% of these very serious cases, no mycotoxic syndrome was identified.

Three patients suffered sequelae from their poisoning: a liver transplant in one case, kidney failure in another and post-anoxic encephalopathy in the third.

In addition, two people died from amanita poisoning after mistaking a toxic species for an edible species. One of the patients reported having picked and eaten what they thought were horse mushrooms, and the other field mushrooms, both of which are edible. In the absence of any photographs, it was not possible to identify the species actually consumed.

Lastly, among the very serious cases, an 11-month-old child was hospitalised in intensive care for severe hepatitis following consumption of mushrooms picked by the family. It is important to reiterate that very young children should not eat wild mushrooms.

Although recommendations are issued by ANSES every year, avoidable poisoning cases are regularly reported to the PCCs, involving the consumption of raw mushrooms, consumption by young children during meals, or use of a mushroom recognition app on a smartphone.

1. Gastroenteritis and hepatic syndrome mainly due to *Amanita phalloides*, *Amanita virosa*, *Amanita verna*, certain macrolepiota and *Galerina*.

2. Myco-atropine syndrome, especially neuropsychic, after ingestion of *Amanita pantherina*, *Amanita muscaria*, *Amanita regalis* and *Amanita jonquillea* in particular.

3. Gastroenteritis and cardiovascular syndrome due to ingestion of white clitocybes and inocybes.

Table 3 : Means of identify the picked mushrooms

Mushrooms identified?	Number of meals	%
No	494	74.8
Yes	166	25.2
<i>By a third party</i>	79	49.4
<i>By a pharmacist</i>	31	16.0
<i>Using a book</i>	26	14.3
<i>Using a smartphone app</i>	19	10.5
<i>By a mycologist from an association</i>	14	8.0
<i>Internet</i>	10	7.5

Tableau 4 : Species sought versus species picked and eaten, identified by a mycologist and responsible for poisoning (source: SICAP)

Species sought	Species actually picked
Girole	Jack o'lantern
Cep	Satan's bolete / Fly agaric / <i>Rubroboletus legaliae</i>
Parasol mushroom	Death cap / <i>Chlorophyllum brunneum</i> / Panther cap / <i>Entoloma sinuatum</i>
Unspecified bolete	Satan's bolete / European white egg
Field mushroom	Yellow stainer
Saint George mushroom	<i>Inocybe</i> / <i>Clitocybe</i> / Brown roll-rim
Grey knight	<i>Entoloma sinuatum</i>
Caesar's mushroom	Fly agaric
Fairy ring mushroom	<i>Inocybe</i> / <i>Entoloma sinuatum</i>
Scarletina bolete	<i>Rubroboletus legaliae</i> / Bitter beech bolete / Satan's bolete
Puffball	European white egg
Charcoal burner	<i>Russula badia</i>
Amethyst deceiver	Rosy bonnet
Trooping funnel	<i>Entoloma sinuatum</i>
Miller	<i>Entoloma sinuatum</i>
<i>Laccaria</i>	<i>Mycena</i>

Tableau 5 : Number of serious cases and deaths per year

	2016	2017	2018	2019	2020	2021	2022
Serious cases	11	41	24	27	34	41	37
% of total cases	1.30%	2.40%	2.30%	1.30%	2.50%	3.20%	1.80%
Deaths	0	2	1	3	5	4	2
% of total cases	0%	0.10%	0.10%	0.10%	0.30%	0.30%	0.10%

To limit the risk of poisoning, ANSES recommends:

- Only picking mushrooms that you know very well: some highly poisonous fungi closely resemble edible species. In addition, poisonous fungi can grow in the same place that you picked edible mushrooms the previous year.
- If you have the slightest doubt about the condition or identification of any of the mushrooms you have picked, do not consume them until you have had them checked by a specialist. You can seek help from a pharmacist, or local mycology associations and societies.
- Only pick specimens in good condition and take the entire mushroom (stalk and cap), to facilitate identification.
- Avoid picking mushrooms near potentially polluted sites such as roadsides, industrial zones and landfills.
- While picking, carefully separate the mushrooms according to species, to avoid mixing pieces of poisonous fungi with edible mushrooms.
- Place the mushrooms in a box, crate or basket and never in a plastic bag, which accelerates their decomposition.
- Store the mushrooms in the refrigerator (maximum 4°C) while avoiding contact with other foods, and eat within two days of picking.
- Consume in reasonable quantities after cooking them thoroughly (pan-fry for 20 to 30 minutes or boil in water for 15 minutes), and never eat wild mushrooms raw.
- Never feed the mushrooms you have picked to young children.
- Ensure that children never put mushrooms found in the garden or school playground in their mouths.
- Do not consume mushrooms identified solely by a fungi recognition app on a smartphone, due to the high risk of error.
- Do not eat mushrooms sold by street vendors.

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["Mushroom foraging" information sheet](#)

[Poisonings due to wild mushroom consumption: stay alert!](#)

[Advice from ANSES on video](#)