BC Centre for Disease Control
An agency of the Provincial Health Services Authority

DEATH CAP MUSHROOMS

Amanita phalloides mushrooms in city environments in British Columbia

Briefing package for parks and municipalities

September 2018

Provincial Health Services Authority
Province-wide solutions. Better health.

A research and teaching centre affiliated with UBC

Suggested citation for this document:
L. McIntyre, P. Kroeger, S. Berch and the toxic *Amanita phalloides* mushrooms in city environments working group. *Amanita phalloides* mushrooms in city environments in British Columbia: briefing package for parks and municipalities. August 2018. Available on-line from: http://www.bccdc.ca/health-info/food-your-health/fruits-vegetables-grains/wild-mushrooms

Any questions may be directed to fpinfo@bccdc.ca

Agencies that participated in the working group and reviewed the information in this document are gratefully acknowledged and include:

- BC Ministry of Environment
- BC Ministry of Health
- BC Drug and Poison Information Centre
- Island Health Authority and the office of the Medical Health Officer
- Fraser Health Authority
- Interior Health Authority
- University of British Columbia
- Vancouver City Parks Department
- Vancouver Coastal Health Authority
- Vancouver Mycological Society

Photo acknowledgements:
Cover photo: Justin Pierce https://mushroomobserver.org/80840
Figure 1: Paul Kroeger
Figure 5: Fred Notzel (Straw mushroom); Richard Nadon (puffballs); Britt Bunyard (Other *Amanita* species)

***Amanita phalloides* mushrooms in city environments in British Columbia**

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Addressing risk for death cap mushrooms in British Columbia city environments

Purpose

Death cap mushrooms cause most fatal mushroom poisonings around the world. Originating in Europe, the mushroom is now growing in British Columbia, and is recognized as an emerging public health concern in urban areas. The information in this document is meant to serve as a resource for municipal and provincial authorities and personnel with the responsibility to manage safety of the environment and public health. These toxic mushrooms may grow public areas such as school yards, parks, recreational sites, urban streets, outdoor shared space areas, as well as private property. They can cause serious poisoning when picked by individuals for food, or when accidentally ingested by children and pets.

Mostly white death cap mushroom caps showing satiny sheen.

PAUL KROEGER photo

Figure 1. Death cap mushrooms photographed in Vancouver, BC

Background

Death cap mushrooms are poisonous

The death cap mushroom (scientific name *Amanita phalloides*) contains toxins that damage the liver and kidney. After ingestion, within eight to 12 hours, symptoms of cramping, abdominal pain, vomiting and watery diarrhea occur. Severe diarrhea may lead to dehydration. The person can then start to feel better after the first 24 hours of symptoms, and may continue to feel better for up to 3 days.

Figure 2. Amanitin-containing mushrooms cause most mushroom poisoning deaths

Patients often describe this initial phase of illness as if they are recovering from a cold or flu.

During this time, death cap toxins are damaging vital organs. Following this period, however, a second wave of diarrhea and cramping occurs and the person becomes very ill. Further symptoms include low blood pressure, jaundice, liver failure, kidney failure, bleeding problems, seizures, delirium, convulsions and coma. The time from initial symptoms to death is 7 to 10 days in severe illness, and medical treatment including organ transplants may be required to prevent death. Prompt treatment in a hospital is necessary, and even with treatment the mortality rate is 10-30% (i.e. even with hospitalization, 1 to 3 out of 10 people die after eating a death cap mushroom).

Cooking the mushroom does not inactivate the toxin. Even when the mushroom is boiled and the water is discarded, the toxin remains.

Figure 3. Mortality rate for death cap mushroom ingestion is between 10 to 30%

Where death cap mushrooms are found

Death cap mushrooms were introduced to western North America decades ago, and are native and widespread in Europe. They are found in several BC geographic areas, predominantly in cities and urban areas. Death caps were first found fruiting under BC trees in 1997.

Confirmed sightings of death caps have been reported in southern Vancouver Island, Galiano Island, Vancouver and the Fraser Valley. Since 1996, over 100 sightings, three confirmed poisonings and one death have been recorded (link to E-flora).[1] The suspected range for death caps in BC is shown in the map (Figure 4).(1)

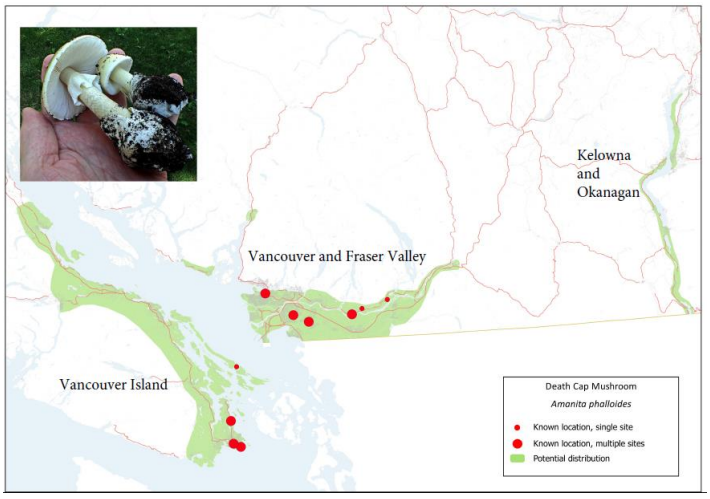


Figure 4. Map of suspected range for death caps in BC (sourced from invasive species site).

[1] E-flora BC distribution Map for *Amanita phalloides* http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Amanita%20phalloides on June 12, 2018

This mushroom has not yet been found in a BC forest. It has been documented once from a single native BC Garry oak tree. (2) This is of concern, as it suggests the fungus could be adapting to native BC tree species.

Death cap mushrooms are found world-wide. Although not native to North America, the mushrooms were introduced decades ago in eastern and western North America on the roots of imported trees: hardwoods (oaks, beeches, chestnuts, birches, filberts, hornbeams) and conifers (pines and spruces). Death cap mushrooms are mycorrhizal, which means that they depend upon a mutually beneficial association with tree roots in order to survive (Figure 4). Many different kinds of mushrooms are mycorrhizal and they all benefit the health of their host trees, and in return receive sugar (energy) and carbohydrate sources from the trees.

Because of the association with drought tolerant shade trees commonly planted in city boulevards and parks, death cap mushrooms are of most concern to the urban population.

Introductions from imported trees may have occurred more than once into different areas of BC. There is also evidence to suggest northern migration of *Amanita* in North America, as has been seen in California. (3, 4) This fungus is being observed more frequently now in Victoria and Vancouver because host trees have matured and excess sugars are available to allow the fungus to form fruiting bodies (the mushroom is the fruiting body of the death cap fungus as shown in Figure 5).

Cities in BC with mild climates where broadleaf boulevard trees have been planted but death cap mushroom has not yet been reported (e.g. Kelowna, Nanaimo, Prince Rupert and more) should be carefully checked for death cap mushrooms.(1)

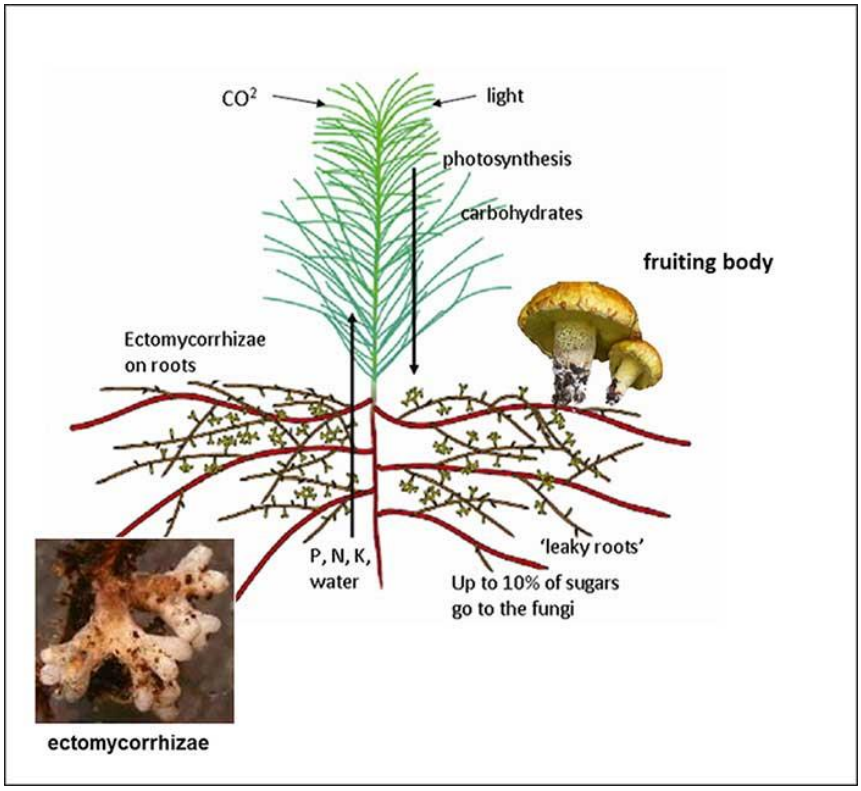


Figure 5. Ectomycorrhizal association between mushroom and host tree

Photocredit: Dr. C. Cripps https://www.americanforests.org/wp-content/uploads/2014/10/3.-Diagram-of-seedling-and-ectomycorrhizal-fungi-CCripps_web.jpg

It is also possible that death cap mushroom will be found wherever nut trees such as sweet chestnut or filbert (hazelnut) have historically been grown. In BC, this includes parts of southern Vancouver Island and the smaller islands, the lower Fraser Valley,

and the Okanagan Valley, although it has not yet been reported from the latter area.(1)

Death cap mushrooms look edible

A three year old child died in the fall of 2016, after eating soup for dinner that contained a death cap mushroom. The mushroom was picked by family on a city street in Victoria, BC and they did not recognize it as a poisonous variety.

Death cap mushrooms can be mistaken for edible mushrooms

Paddy-Straw Mushrooms *Puffball Mushrooms* *Other Asian Amanita Species*

Figure 6. Death cap look alikes: mushrooms that death caps are commonly mistaken for

Identification features for death cap mushrooms include white to green cap colour with satiny sheen, white gills, skirt on the stem and cup at the base of the stem found below the ground (refer to death cap poster in Appendix 2). Death cap mushrooms can look like Asian paddy straw mushrooms (Figure 6), a cultivated edible species which does not grow naturally here. Death cap mushrooms can also look like puff ball mushrooms when they are immature and in the small button stage – compare the puffball mushrooms shown to the death cap mushrooms shown on the cover and in the cross-section photo in the poster (Appendix 2) . Death caps, mistaken for puff balls, nearly caused the death of a Victoria man in 2003.(5) These mushrooms are particularly risky to recent immigrants from Asia and Europe who have a cultural traditional of foraging food from their environment.

Managing risk in public spaces

The following information was sourced from the death cap mushroom profile located on the BC invasive species web-site. (1)

Removal of trees

Removal of trees that contribute to shade, health and beauty of public spaces is not recommended.

Eradication of the death cap mushroom would be difficult. The fungus forms a mutually beneficial mycorrhizal association with the roots of host trees, therefore removal of one tree in an area would not eliminate the problem unless all host trees in that area were also removed.

However, targeting known individual trees in high risk areas, for example in school yards and playgrounds, may be an option.

Selection of non-host trees for new or replacement plantings in parks.
Municipalities and individuals can select non-host trees (i.e. trees that will not support growth of death cap mushrooms because they do not form mycorrhizal associations with death cap fungus) for new or replacement planting in parks, boulevards, and private properties.

A list of host and non-host boulevard trees can be found in Appendix 1.

When do death cap mushrooms grow?

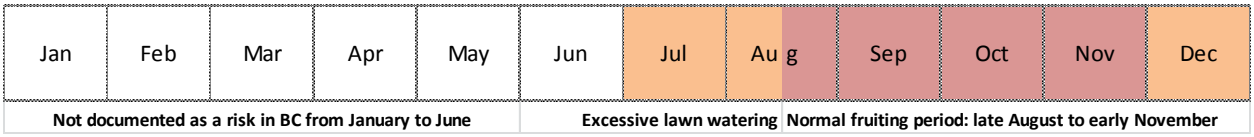


Figure 7. Months when death caps mushrooms are a risk

After periods of heavy rain, mushrooms have occurred in June and July. Death caps usually appear in late August through to early November. Where lawns are watered, death cap mushroom can start fruiting in July. Some mushrooms may persist into December. Death caps have not been found in BC or Washington State in the months of January, February or March, however mushroom fruiting season is changing with the changing climate.

Removal and disposal of fruiting bodies of death cap mushrooms
Safe removal and disposal of the mushrooms, preferably in the button stage, would help manage the problem by reducing risk of the mushrooms being picked and ingested, and reducing the spread or mushroom spores. BUT removal would only work if municipalities are able to return to each site every few days, as the new mushrooms will regrow quickly. Some municipalities have a policy of staff removing death cap mushrooms from known fruiting sites.

Death cap mushrooms can be composted in municipal systems, but do not put into wood chipper trucks to avoid spreading in mulches.

Managing disposal in municipalities:

- ✓ Municipal composting sites that reach higher temperature of greater than 60°C would be acceptable. Food waste composting that includes meat and bones along with yard trimming piles provide suitable conditions and high enough temperatures to inactivate spores.
- ✓ Disposal into the regular garbage waste stream is acceptable.
- ✘ Disposal with tree trimmings that are mulched and spread without high temperature composting is not recommended.

Municipal parks and grounds maintenance personnel and professional landscapers should be advised not to dispose of removed death cap mushrooms into chipper trucks or other waste streams that might be used as mulches or soils amendments without high temperature composting.

Managing disposal at home:

- ✓ Bag and dispose of death caps into the regular garbage. Death caps should NOT be composted at home as the temperatures may not be high enough to inactivate spores.

General guidance for home owners at this time is to dispose of all death caps into the regular waste stream. Municipalities may recommend alternate methods (municipal composting) depending on their local knowledge of how the compost is managed. As long as composting temperatures reach an internal temperature of 60°C or higher under moist conditions for several hours, and piles are turned so that all parts are exposed to this temperature, fungal spores would be eliminated in the composting pile.(6)

Hand contact with death cap mushrooms

There is no evidence that direct hand contact with death cap mushrooms is dangerous. To provide additional protection gloves may be worn when disposing of death cap mushrooms.

Always wash your hands after handling the mushrooms.

Report sightings of death cap mushrooms

A reporting form is available at the Government of BC site: *BC Inter-Ministry Invasive Species Working Group* at this site: https://www.for.gov.bc.ca/hra/invasive-species/reportInvasives.htm

Mowing the lawn will not get rid of death cap mushrooms

Limit growth by NOT WATERING known sites during the summer months

Removal of all death caps before mowing is recommended.

Mowing does not get rid of the part of the fungus that lives perennially on the roots of the host tree.

Mowing might also spread the fungus by dispersing spores into the air and onto mowing equipment that then moves on to another site possibly carrying bits of the mushrooms with it.

Kicking, stomping or cutting off mushrooms will not eradicate them because their mycelium lives below ground on the roots of host trees.

Do not water known death cap mushroom sites to prevent its fruiting during the summer. Fruiting will likely commence when the rain returns in the fall.

There are also apps for Report-InvasivesBC for iPhone and iPad or Android. Provide the exact location of growth, e.g., the street address, park name, GPS coordinates, etc.

Include a description about where the mushroom was growing in the comments section of the online invasive species report form. Useful detail to include:
was the mushroom

- growing in soil, grass or on wood?
- near or under what kind of trees?

If possible take and save a photo of the mushroom, the surrounding area, the tree and the tree leaves. Be ready to send this information when contacted by e-mail. Collect the mushroom specimen for verification as below.

How to collect and submit a mushroom for death cap identification

Experts may want to verify the mushroom species as a death cap. There is a BC-wide project led by the University of British Columbia to genetically identify the numerous varieties of mushrooms that may be located in new areas or may be a new species, undescribed in our province. Collecting and submitting a mushroom to an expert for cataloguing is called 'vouchering'. Only vouchered specimens appear in the official record, and it is highly likely the approximately 100 known locations of death cap mushrooms is low because of under-reporting. Presumptive sightings can be made with digital photographs and a complete description in the report form, but confirmed sightings must include specimen examination. Very little work of this nature is done in BC, and this is a potential educational activity for volunteers &/or parks programs for all invasive species.

Steps to collect and submit a suspected death cap mushroom for identification:

1. Report the sighting as described.
2. Collect a complete intact mushroom and include the base. Dig under the mushroom to remove the base intact and include small pieces of wood or plant material (not soil). If the mushroom was growing with a tree, include a couple leaves from the tree for identification as well.
3. If collecting more than one mushroom from different locations, number each mushroom and record location and habitat information for each one.
4. Wrap the mushroom carefully in dry paper towel to protect it from damage. If submitting more than one mushroom, wrap each mushroom separately. DO NOT USE PLASTIC BAGS OR PLASTIC WRAP as this will cause the mushrooms to decompose. Refrigerate — DO NOT FREEZE. Provide a warning sign to ensure the death cap is not consumed by anyone, for e.g., "Do NOT Eat"
5. When requested by an expert:

   Courier or drop off the specimen as soon as possible to:
   Poison Control Centre
   655 West 12th Avenue
   Vancouver, BC V5Z 4R4
   For assistance phone 1.604.682.5050
6. ***Preparing the mushroom for courier / drop-off:*** Place wrapped mushrooms into a **rigid** container (e.g. an empty yogurt container) or wrap in several layers of aluminum foil to protect from crushing, and other material (leaves etc.).

7. Include your name and contact information (telephone number, e-mail address) and information on the location and habitat as above.

Risk communication materials

The province of BC and other agencies have prepared some materials and others are in development. Most materials already exist on one or more provincial web-sites.

These materials include:

1. Public warning poster in multiple languages (see Appendix 2).
2. Invasive species alert poster (see Appendix 3).
3. Public warning pamphlet (see Appendix 4).
4. Links and web-sites of interest (see Appendix 5).
5. Frequently asked questions – FAQ (see Appendix 6).
6. Translated messages for use in social media messaging (see Appendix 7).

References

1. B.C. Ministry of Forests Lands Natural Resource Operations and Rural Development. Death cap mushroom (*Amanita phalloides*) BC Prohibited Species Alert: Ministry of Forests; 2018 [March 2018]. Available from: http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10711.
2. Berch SM, Kroeger P, Finston T. The death cap mushroom (Amanita phalloides) moves to a native tree in Victoria, British Columbia. Botany. 2017;95(4):435-40.
3. Wolfe BE, Richard F, Cross HB, Pringle A. Distribution and abundance of the introduced ectomycorrhizal fungus Amanita phalloides in North America. New Phytol. 2010;185(3):803-16.
4. Pringle A, Adams RI, Cross HB, Bruns TD. The ectomycorrhizal fungus Amanita phalloides was introduced and is expanding its range on the west coast of North America. Mol Ecol. 2009;18(5):817-33.
5. Smart A. Everything you need to know about death cap mushrooms. Victoria Times Colonist. 2016 Oct 14, 2016.
6. Wichuk KM, Tewari JP, McCartney D. Plant Pathogen Eradication During Composting: A Literature Review. Compost Science & Utilization. 2011;19(4):244-66.

Appendix 1. Host and non-host trees for *Amanita phalloides* death cap mushrooms

The following information was sourced from the death cap mushroom profile located on the BC invasive species web-site and was modified from list of preferred boulevard trees provided by the Municipality of Saanich (1):

Status of boulevard trees as hosts for death cap mushroom (*Amanita phalloides*).

Known* host trees for death cap mushroom	
Common name	**Scientific name**
Hornbeam	*Carpinus betulus***
English oak	*Quercus robur***
Sweet chestnut	*Castanea sativa***
Beech	*Fagus sylvatica***
Filbert	*Corylus avellana***
Linden	*Tilia* species
Garry oak	*Quercus garryana*
Northern red oak	*Quercus rubra*

* Demonstrated host trees in British Columbia.
**Listed in rough order of number of occurrences as host tree in BC.

Possible* host trees for death cap mushroom	
Common name	**Scientific name**
Birch	*Betula* species
Scarlet oak	*Quercus coccinea*
Pin oak	*Quercus palustris*

* Forms ectomycorrhizae and belongs to same genus as known host species.

Non-host* trees for death cap mushroom	
Common name	**Scientific name**
Red maple	*Acer rubrum*
Amur maple	*Acer ginnala*
Paperbark maple	*Acer griseum*
Bigleaf maple	*Acer macrophyllum*
Norway maple	*Acer platanoides*
Pacific Sunrise maple	*Acer truncatum x Acer platanoides*
Red horse chestnut	*Aesculus x carnea*
Eastern redbud	*Cercis canadensis*
Nootka cypress	*Chamaecyparis nootkatensis*
Dogwood	*Cornus kousa x nuttalli*
Hawthorn	*Crataegus x mordenensis*
Glory ash	*Fraxinus excelsior*
Maidenhair tree	*Ginkgo biloba*
Honey locust	*Gleditsia triacanthos*
Golden rain tree	*Koelreuteria paniculata*
Sweetgum	*Liquidambar styraciflua*
Magnolia	*Magnolia* species
Black Tupelo	*Nyssa sylvatica*
Persian ironwood	*Parrotia persica*
London plane	*Platanus x acerifolia*
Ornamental cherries and plums	*Prunus* species

Non-host* trees for death cap mushroom	
Common name	**Scientific name**
Oakleaf mountain ash	*Sorbus thuringiaca*
Japanese snowbell	*Styrax japonicus*
Western redcedar	*Thuja plicata*

* These trees do not form ectomycorrhizae.

Probably non-host trees for death cap mushroom	
Common name	**Scientific name**
Yellowwood*	*Cladrastis kentukea*
Serbian spruce**	*Picea omorika*
Douglas-fir***	*Pseudotsuga menziesii*
Scot's pine	*Pinus sylvestris*

* Mycorrhizal status not known. Some trees in same family form ectomycorrhizae.

**Forms ectomycorrhizae (and spruce is a known host in Europe) but our west coast North American death caps thus far are reported only from broadleaf trees.

Appendix 2. Public warning poster for death cap mushroom in multiple languages

An on-line copy of this poster is available at this location: http://www.bccdc.ca/resource-gallery/Documents/Educational%20Materials/EH/FPS/Fruit%20and%20Veg/Death%20Cap%20mushroom%20caution%20poster%20-%20Mar%202018.pdf

Appendix 3. Invasive species alert on death cap mushroom (Amanita phalloides)

This two page monograph is available on the invasive species web-site at this link: https://www.for.gov.bc.ca/HRA/invasive-species/Publications/Factsheet%20Death%20Cap%20Mushroom%20Aug%202017.pdf

INVASIVE SPECIES ALERT!

DEATH CAP MUSHROOM (*Amanita phalloides*)

Native range

Death cap mushrooms are native to Europe.

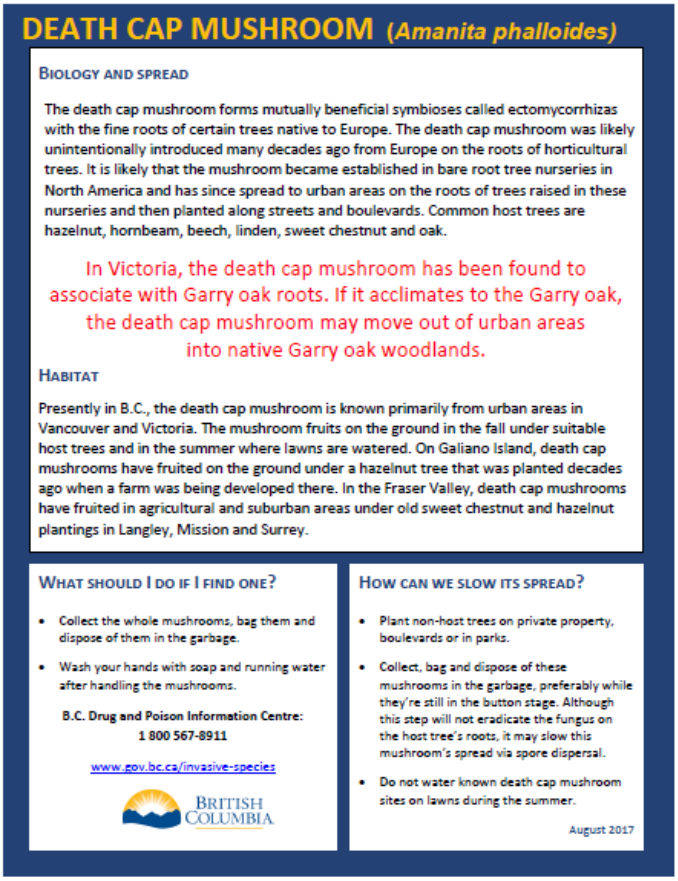
Description

- Death cap mushrooms emerge from the ground as white buttons (called primordia) about the size of small chicken eggs. At this stage, they can be mistaken for puffballs or straw mushrooms.
- If the primordia are cut in half from top to bottom, a very careful examination will reveal the cap, gills and stem of a tiny mushroom.
- As the fungus matures, the stem elongates and the white tissue enveloping the developing mushroom (universal veil) breaks, leaving a membranous white sac (volva) at the base of the stem that may require careful excavation to keep it intact for observation.
- As the stem elongates further and the cap expands, a second white tissue (partial veil) that had covered the gills breaks, leaving a skirt-like ring or veil on the stem.
- In the mature mushroom, the cap has a distinctive olive or green hue, although the cap overall can appear pale green, pale brown, pale yellow or sometimes white, with: white gills; a white stem (or tinged with the cap's colour); a white, skirt-like partial veil or ring on the stem; and a white, membranous, sac-like volva surrounding the base of the stem.
- The death cap mushroom usually fruits in the fall, but it can fruit in the summer when yards are watered.
- Visit the following link for more photos and descriptions: https://en.wikipedia.org/wiki/Amanita_phalloides

REPORT INVASIVE SPECIES
www.reportinvasives.ca

PRIMARY IMPACT

The death cap mushroom is deadly poisonous if eaten. It can be mistaken for edible puffballs when young or the Asian straw mushroom when older.



DEATH CAP MUSHROOM (*Amanita phalloides*)

Biology and spread

The death cap mushroom forms mutually beneficial symbioses called ectomycorrhizas with the fine roots of certain trees native to Europe. The death cap mushroom was likely unintentionally introduced many decades ago from Europe on the roots of horticultural trees. It is likely that the mushroom became established in bare root tree nurseries in North America and has since spread to urban areas on the roots of trees raised in these nurseries and then planted along streets and boulevards. Common host trees are hazelnut, hornbeam, beech, linden, sweet chestnut and oak.

In Victoria, the death cap mushroom has been found to associate with Garry oak roots. If it acclimates to the Garry oak, the death cap mushroom may move out of urban areas into native Garry oak woodlands.

Habitat

Presently in B.C., the death cap mushroom is known primarily from urban areas in Vancouver and Victoria. The mushroom fruits on the ground in the fall under suitable host trees and in the summer where lawns are watered. On Galiano Island, death cap mushrooms have fruited on the ground under a hazelnut tree that was planted decades ago when a farm was being developed there. In the Fraser Valley, death cap mushrooms have fruited in agricultural and suburban areas under old sweet chestnut and hazelnut plantings in Langley, Mission and Surrey.

What should I do if I find one?

- Collect the whole mushrooms, bag them and dispose of them in the garbage.
- Wash your hands with soap and running water after handling the mushrooms.

B.C. Drug and Poison Information Centre:
1 800 567-8911

www.gov.bc.ca/invasive-species

BRITISH COLUMBIA

How can we slow its spread?

- Plant non-host trees on private property, boulevards or in parks.
- Collect, bag and dispose of these mushrooms in the garbage, preferably while they're still in the button stage. Although this step will not eradicate the fungus on the host tree's roots, it may slow this mushroom's spread via spore dispersal.
- Do not water known death cap mushroom sites on lawns during the summer.

August 2017

Appendix 4. Warning pamphlet for general public

Access brochure on this site: http://www.bccdc.ca/health-info/food-your-health/fruits-vegetables-grains/wild-mushrooms.

Symptoms of poisoning

The death cap contains toxins that damage the liver and kidney. Cooking does not inactivate the toxin.

— 1 to 3 out of every 10 people who get sick from death cap mushrooms will die —

After ingestion, within 8 to 12 hours, these symptoms occur:

- cramping
- abdominal pain
- vomiting
- watery diarrhea
- dehydration

After 24 hours you may feel better, and think you had a cold or flu. But during this time the death cap toxins are damaging vital organ functions.

A second wave of diarrhea and cramping occur within 72 hours after eating the mushroom, resulting in severe illness:

- low blood pressure
- jaundice
- liver failure
- kidney failure
- seizures
- delirium
- convulsions
- coma
- gastrointestinal bleeding

The time from initial symptoms to death is 7 to 10 days in severe illness. Organ transplants may be required to prevent death.

If you have eaten the mushroom go to the hospital and call poison control immediately at 1-800-567-8911

The following agencies participated in the creation of this pamphlet

BC Centre for Disease Control
An agency of the Provincial Health Services Authority
UBC
Interior Health
island health
WALL
BRITISH COLUMBIA
CITY OF VANCOUVER
Vancouver Coastal Health
fraserhealth

For more information please consult these sites:

www.gov.bc.ca/invasive-species

www.bccdc.ca/health-info/food-your-health/fruits-vegetables-grains/wild-mushrooms

www.vanmyco.org

Photo credits: Wikipedia commons 2005-09 (death cap); Richard Nadon (puffballs); Fred Notzel (paddy straw); Justin Pierce Mushroom Observer 80840 (death caps during maturity).

Created September 2018

DEATH CAP MUSHROOMS CAN KILL

If you have eaten the mushroom go to the hospital and call poison control immediately at 1-800-567-8911

yellow, green, or white cap
white gills
base no bulbe cup, often below ground
white ring skirt on stem

These mushrooms grow in urban areas of Victoria and Vancouver.

Read this guide to protect yourself, your family, and your pets.

The death cap mushroom (*Amanita phalloides*) is poisonous

Death cap mushrooms cause most of the fatal mushroom poisonings in the world.

This mushroom now grows in urban areas of British Columbia, even though it has not yet been found in a BC forest.

The death cap mushroom is considered an invasive species.
Mushrooms can normally be found growing in the fall or earlier if lawns are watered.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot dessert exhibits a risk in BC from January to June						Excessive to overwatering	Normal fruiting period				

Death caps were introduced to BC from imported European trees (beech, chestnut, hornbeam, English oak and many others). There are over 100 sightings of this mushroom in Victoria and the lower mainland (Vancouver to the Fraser Valley) where these trees now grow. Death cap also grows with our native Garry oak.

We don't recommend removing these trees as they provide shade and beauty. Consult a garden nursery when choosing new trees for sites.

Death cap mushroom at various stages of maturity

Edible look-alike mushrooms

Death cap mushrooms can look like Asian paddy straw mushrooms, a cultivated edible species which does not grow naturally here. In 2016 a BC child died after eating a death cap that was mistaken for a paddy straw mushroom.

Asian paddy-straw mushrooms

Death caps can also look like puffball mushrooms when they are immature and in the small button stage. In 2003 an adult nearly died after mistaking a death cap for one of these.

Puffball mushrooms

These mushrooms are particularly risky to recent immigrants who have a cultural tradition of foraging food from their environment.

Protecting yourself

Only pick wild mushrooms if you are or are with a knowledgeable person who can identify the mushrooms. Do not eat anything you cannot identify is an edible species. Scan to see local BC mushroom species.

Call poison control at 1-800-567-8911

Death caps are especially dangerous to children and pets. Limit their access to death cap mushrooms.

- Avoid areas during play-time and walks where death caps are known to grow.
- Immediately remove any mushrooms from their mouths to avoid risk of swallowing. Consult your doctor or veterinarian if any part of a death cap mushroom was ingested.
- Remove and dispose of death caps in the area.

Disposing of death caps

If you find death caps growing in your yard, dispose of them by:

- Putting into the municipal compost (green bin), or
- Bagging and disposing into the regular garbage.

Home compost may not reach high enough temperature to inactivate spores.

Hand contact with death caps is not a risk, however, you may wear gloves when handling. Always wash your hands after handling.

Mowing the lawn will not get rid of the mushroom fungus (most of the fungus lives underground). Removal before mowing to avoid spread is recommended. Avoid watering in areas where death caps grow, otherwise death caps may grow earlier.

Appendix 5. Links of interest

Priority invasive species main page: https://www.for.gov.bc.ca/hra/invasive-species/priority.htm

Invasive *Amanita phalloides* detailed profile: http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10711

Invasive *Amanita phalloides* BC distribution: https://www.for.gov.bc.ca/hra/invasive-species/Publications/Map_DeathCapMushroom_Dec07.pdf

BCCDC wild mushroom page: http://www.bccdc.ca/health-info/food-your-health/fruits-vegetables-grains/wild-mushrooms

Wild mushroom identification glossary: http://www.zoology.ubc.ca/~biodiv/mushroom/

Amanita phalloides locations of sightings on UBC e-flora map: http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Amanita%20phalloides

Appendix 6. Frequently asked questions (FAQ) about death cap mushrooms

Points of contact for frequently asked questions are shown below.

Frequently asked questions	Contact
Report ingestion, possible poisoning	Poison Control Centre (DPIC) at 1.800.567.8911 or 604.682.5050
Report pet ingestion, possible poisoning	Veterinarian or DPIC
Do I have a host tree growing in my yard?	City / Municipality
Should we create a monitoring program of host trees by local parks or municipal government?	City / Municipality
How do I safely dispose of a death cap growing in my yard?	City / Municipality
I've touched, or my child touched a mushroom which we think might be a death cap, are we at risk?	DPIC
How do we (city / municipality) find a local expert to identify the mushrooms growing in the park or along boulevard?	Local mycological society or submit inquiry to BC invasive species
My child plays in this park and I think there are death cap mushrooms growing there – can you confirm this? Can you remove them? What should I do?	City / Municipality
The grounds in my office/condo building have death caps growing on them and I'm worried about my dog eating them. Can you remove them? What should I do?	Strata and City /Municipality
Are wild mushrooms allowed to be sold at a farmers' market?	Market organizer
Where can I get a warning sign? Am I allowed to post it? Where can I get translations for messages about wild mushrooms?	BCCDC / DPIC Link

Answers to Frequently Asked Questions (FAQ)

FAQ	Answer
Is this wild mushroom that I've picked from this park (location) safe to eat?	No. If you are not certain of the mushroom identity and edibility you should not eat it. You should only pick and forage wild mushrooms if you are a knowledgeable expert, or are going out with a knowledgeable expert.
There are death cap mushrooms growing in my yard: how do I stop them from growing?	It is very difficult to stop mushrooms growing, most of the mushroom forming fungus is actually growing underground naturally in the soil. This fungus also grows in association with specific trees that are 'hosts' for this mushroom. There are preventative steps you can take: • Don't overwater the lawn in the summer. • Pick the young buttons and dispose before they mature and sporulate and spread the mushroom. • Check the list of host trees for *Amanita phalloides* before planting new trees. If you have one or more of these trees growing in your yard, consider if removal is an option. Note: tree removal is not recommended, except under special circumstances.

FAQ	Answer
There are death cap mushrooms growing in my yard: how do I dispose of them?	Dispose of death cap mushrooms in the municipal compost or in your regular garbage – not your personal compost (temperatures may not be high enough to destroy the mushroom spores). Prevent pets and children from eating these mushrooms in your garbage. Hand contact with death cap mushrooms will not cause poisoning; wear gloves and wash hands after touching and handling mushrooms as an extra safety precaution.
Where do I buy wild mushrooms that are safe to eat?	Only purchase and eat wild mushrooms collected by a knowledgeable expert. Wild mushrooms are an unregulated food.

Appendix 7. Translated messages for social media

The following messages have been translated into multiple languages for social media and communication. Please contact fpinfo@bccdc.ca to obtain a copy of these translations.

Death cap can kill. Do not eat.

Do you have death cap mushrooms growing in your neighbourhood?

Remove or report sightings of death caps. What you need to know:

- Wash hands with soap and water after touching death cap mushrooms.
- Dispose of the mushroom in the regular garbage – not the compost.
- Do not allow pets to eat death caps. If you suspect your pet has eaten this mushroom visit your veterinarian.
- To report a sighting of a death cap visit [URL to be inserted here, suggest Invasive species reporting site at https://www.for.gov.bc.ca/hra/invasive-species/reportInvasives.htm]
- To learn more about this mushroom visit [URL to be inserted here, your agency site information or suggest BCCDC site at http://www.bccdc.ca/health-info/food-your-health/fruits-vegetables-grains/wild-mushrooms]

Language translations include:

- Vietnamese
- Traditional and simple Chinese
- Japanese
- Korean
- Russian
- Tagalog (Filipino)
- Thai