|  |  |
| --- | --- |
| Logo AGES | |
| Tropane alkaloids | |
|  |  |
| 09.05.2025 21:43 Uhr | |

**Tropane
alkaloids**

**Tropane
alkaloids**

Last
change:
04.10.2024

**Profile**

**Description**

Tropane
alkaloids
are
natural
plant
constituents
found
in
a
wide
variety
of
plants,
especially
in
nightshade
plants
such
as
henbane,
[datura](en/plant/plant-health/pests-from-a-to-z/common-thorn-apple)
and
belladonna.
More
than
200
different
tropane
alkaloids
are
known
such
as
atropine
and
scopolamine.
Plants
produce
tropane
alkaloids
to
protect
themselves
from
predators
(e.g.,
insects).
These
alkaloids
are
also
toxic
to
humans.

**Occurrence**

Plants
such
as
datura
also
grow
in
grain
fields.
When
the
grain
is
harvested,
these
plants
are
also
harvested.
In
this
way,
seeds
from
plants
that
produce
tropane
alkaloids
can
get
among
the
cereal
grains.
There
are
ways
of
sifting
out
foreign
seeds,
but
if
the
seeds
are
roughly
the
same
size,
this
is
not
always
entirely
successful.
These
foreign
seeds
are
then
found
in
the
grain
products
and
lead
to
measurable
levels
of
tropane
alkaloids.
In
addition,
sap
from
datura
that
escapes
during
threshing
can
be
transferred
to
the
harvested
crop
and
cause
contamination.
The
fundamental
goal
in
agriculture
is
to
avoid
these
foreign
plants
in
the
field.

**Health
risk**

Already
relatively
quickly
(5
to
30
minutes)
after
ingestion
of
tropane
alkaloids,
symptoms
of
poisoning
may
occur.
Symptoms
of
poisoning
with
these
substances
are
primarily
dryness
of
mucous
membranes
(reduced
salivation,
dry
mouth),
skin
dryness
and
redness,
possible
pupil
dilation,
and
in
higher
quantities
drowsiness,
visual
disturbances,
palpitations,
disorientation
and
hallucinations.

Cases
of
poisoning
are
known
from
Slovenia,
among
other
countries,
where
a
total
of
73
consumers
had
eaten
buckwheat
products
contaminated
with
datura
seeds
in
2003.
Symptoms
such
as
dry
mouth,
hot
red
skin,
visual
disturbances,
tachycardia,
urinary
retention,
ataxia,
speech
disorders,
disorientation,
and
hallucinations
were
observed.
Symptoms
occurred
within
48
hours.
Measured
levels
were
above
3
mg/kg
(3000
µg/kg)
in
approximately
half
of
the
products,
with
the
highest
level
being
38
mg/kg
(38,000
µg/kg)
(Perharič
et
al.
2013,
Perharič
2005).

In
Austria
in
2006,
seven
people
showed
symptoms
of
poisoning
after
consuming
a
millet
dish
contaminated
with
datura
seeds.
Symptoms
ranged
from
dry
mouth
and
dizziness
to
hallucinations.
The
symptoms
disappeared
within
24
hours
(Fretz
et
al.
2007).
According
to
the
Federal
Institute
for
Risk
Assessment
(BfR),
there
are
no
known
cases
in
Germany
of
adverse
health
effects
in
infants,
young
children,
and
consumers
of
other
age
groups
due
to
consumption
of
tropane
alkaloid-contaminated
products
(BfR,
2013).

**Situation
in
Austria**

In
2015
and
2016,
the
levels
of
various
tropane
alkaloids
in
different
food
samples
were
analyzed
in
some
European
countries.
Among
other
things,
the
sum
content
of
atropine
and
scopolamine
was
determined,
especially
for
cereals
and
cereal
products,
herbal
teas,
and
for
some
legumes
and
other
foods.
The
analytical
results
are
presented
in
Table
1.

The
results
show
that
especially
dry
herbal
tea
mixtures
(mean
13.4
µg/kg
and
max
428.5
µg/kg)
and,
to
a
lesser
extent,
products
from
buckwheat,
millet
and
maize
may
be
contaminated
with
atropine
and
scopolamine.
In
addition,
the
proportion
of
samples
with
detectable
levels
in
the
product
group
of
herbal
teas
was
particularly
high
at
over
60
percent.
Although
the
average
sum
contents
of
the
other
product
groups
are
very
low
at
less
than
1
µg/kg,
there
are,
with
the
exception
of
legumes,
oilseeds
and
vegetable
mixtures,
individual
products
with
comparatively
high
contamination
levels
(Mulder
PPJ
et
al.
2016).

Table
1:
Analytical
results
for
the
sum
contents
of
atropine
+
scopolamine
in
different
food
groups,
according
to
Mulder
PPJ
et
al.
2016.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Food** | **Number of samples (n = 1,305)** | **% samples detectable** | **Mean concentration [µg/kg]** | **Max. Concentration [µg/kg]** |
| Flours (buckwheat, millet, corn, etc.) | 268 | 20,1 % | 2,87 | 334,8 |
| Bread and pasta | 195 | 7,7 % | 0,04 | 4,2 |
| Breakfast cereals | 219 | 5,9 % | 0,59 | 108,5 |
| Cookies and pastries | 164 | 13,4 % | 0,06 | 2,3 |
| Cereal-based food for children | 260 | 14,2 % | 0,09 | 4,2 |
| Herbal tea (dry) | 121 | 63,6 % | 13,40 | 428,5 |
| Legumes, oilseeds, vegetable mixtures | 78 | 2,6 % | 0,00 | 0,2 |

Since
2016,
we
have
analyzed
a
total
of
311
food
samples
from
the
Austrian
market
for
tropane
alkaloids.
Tropane
alkaloids
could
be
found
in
only
16
samples.

Table
2:
Our
Analysis
results
for
the
sum
contents
of
atropine
+
scopolamine
in
different
food
groups
(excerpt).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Food** | **Number of samples** | **positive samples** | **Mean concentration [µg/kg]** | **maximum concentration [µg/kg]** |
| Buckwheat (grains, groats) | 43 | 0 | - | - |
| Millet (grains, meal) | 69 | 6 | 1,01 | 32 |
| Corn (grains, flakes, semolina) | 14 | 2 | 2,49 | 19,4 |
| Other cereals (grains, meal) | 31 | 2 | 0,34 | 9,32 |
| Flour (millet) | 9 | 3 | 4,64 | 32,94 |
| Flour (buckwheat) | 8 | 2 | 1,71 | 9,05 |
| Flour, starch (corn) | 12 | 0 | - | - |
| Flour (other) | 7 | 0 | - | - |
| Puffed rice | 15 | 0 | - | - |
| Popcorn | 4 | 0 | - | - |
| Other puffed cereals | 46 | 1 | 0,07 | 3,38 |
| Infant and child nutrition | 18 | 0 | - | - |
| Tea and tea-like beverages | 19 | 0 | - | - |

**Tips**

* If
  symptoms
  of
  poisoning
  occur
  after
  eating
  foods
  that
  may
  be
  contaminated,
  such
  as
  in
  cereals,
  millet
  or
  buckwheat
  and
  foods
  made
  from
  them,
  please
  seek
  medical
  attention
* Any
  leftover
  food
  or
  the
  package
  used
  to
  make
  the
  dish
  should
  be
  handed
  over
  to
  the
  relevant
  food
  inspectorate

**Specialized
information**

**Intake
levels
of
tropane
alkaloids
via
food
and
possible
risks.**

The
European
Food
Safety
Authority
(EFSA)
has
published
a
health-related
guideline
value:
this
acute
reference
dose
(ARfD)
is
the
amount
of
a
substance
per
kilogram
of
body
weight
that
can
be
ingested
via
food
with
a
meal
or
within
a
day
without
any
apparent
risk
to
consumers.
For
atropine
and
scopolamine,
this
acute
reference
dose
is
0.016
µg
per
kilogram
of
body
weight.

For
a
person
weighing
65
kg,
this
calculates
to
a
total
safe
intake
of
1.04
µg
of
atropine
and
scopolamine.
For
a
preschool
child
weighing
20
kg,
a
total
safe
intake
of
0.32
µg
of
atropine
and
scopolamine
is
calculated.

In
2018,
EFSA
prepared
a
detailed
risk
assessment
on
tropane
alkaloids
in
food
(EFSA
2018).
The
model
calculations
showed
that
in
certain
"worst-case"
scenarios,
exceedances
of
the
acute
reference
dose
(ARfD)
could
occur,
especially
in
infants,
toddlers,
and
children.
However,
the
calculations
are
subject
to
some
uncertainties,
mainly
because
the
majority
of
the
underlying
analytical
data
of
tropane
alkaloids
in
food
(95%
of
a
total
of
44,184
data)
were
below
the
limit
of
quantification,
i.e.,
tropane
alkaloids
were
present
only
at
very
low
levels
or
not
at
all
in
these
samples.
The
model
showed
that
in
all
age
groups
the
largest
proportion
of
tropane
alkaloids
is
ingested
via
bread
and
other
cereal
flour
products.

**Limits
for
tropane
alkaloids
in
foods**

Based
on
EFSA's
2018
assessment,
the
European
Commission
considers
the
presence
of
tropane
alkaloids,
particularly
atropine
and
scopolamine,
to
be
a
health
concern.
Therefore,
[Regulation
(EU)
2023/915](https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=CELEX%3A32023R0915&qid=1683815015876)
sets
maximum
levels
for
certain
cereals,
products
derived
from
them,
and
herbal
teas.

**More
information
about
tropane
alkaloids**

[BfR
(Federal
Institute
for
Risk
Assessment)
2021.
High
tropane
alkaloid
contents
in
cereal
products:
Adverse
health
effects
are
possible
in
people
with
heart
problems](https://www.bfr.bund.de/cm/343/hohe-tropanalkaloidgehalte-in-getreideprodukten-bei-menschen-mit-herzproblemen-sind-gesundheitliche-beeintraechtigungen-moeglich.pdf).
[EFSA
(European
Food
Safety
Authority),
Arcella
D,
Altieri
A,
Horváth
Zs,
2018.
scientific
report
on
human
acute
exposure
assessment
to
tropane
alkaloids.
EFSA
Journal
2018;16(2):5160,
29
pp.
doi:10.2903/j.efsa.2018.5160.](https://www.efsa.europa.eu/de/efsajournal/pub/5160)

Mulder
PPJ,
De
Nijs
M,
Castellari
M,
Hortos
M,
MacDonald
S,
Crews
C,
Hajslova
J
and
Stranska
M,
2016.
Occurrence
of
tropane
alkaloids
in
food.
EFSA
supporting
publication
2016:EN-1140,
200
pp.
doi:10.2903/sp.efsa.2016.EN-1140.

Perharič
L,
Koželj
G,
Družina
B,
Stanovnik
L.
(2013):
Risk
assessment
of
buckwheat
flour
contaminated
by
thorn-apple
(Datura
stramonium
L.)
alkaloids:
a
case
study
from
Slovenia.
Food
Addit
Contam
Part
A
Chem
Anal
Control
Expo
Risk
Assess.;30(2):321-30.

Perharič,
L.
(2005).
Mass
tropane
alkaloid
poisoning
due
to
buckwheat
flour
contamination.
Clinical
Toxicology,
43,
413

Fretz
R,
Schmid
D,
Brueller
W,
Girsch
L,
Pichler
AM,
Riediger
K,
Safer
M,
Allerberger
F.
Food
poisoning
due
to
Jimson
weed
mimicking
Bacillus
cereus
food
intoxication
in
Austria,
2006.
Int
J
Infect
Dis.
2007
Nov;11(6):557-8.
epub
2007
May
18.

[Commission
Regulation
(EU)
2023/915
of
25
April
2023
setting
maximum
levels
for
certain
contaminants
in
foodstuffs
and
repealing
Regulation
(EC)
No
1881/2006
(Text
with
EEA
relevance).](https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=CELEX%3A32023R0915&qid=1683815015876)