

Pesticides and contaminants

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This presentation is about
publicly available information and
background knowledge related to
Matrine

AGENDA

What is Matrine?

Why is Matrine an issue also for the organic food market?

Current level of discussion(s)

What is Matrine?

BPDB: Bio-Pesticides DataBase

*According to the Bio-Pesticides DataBase,
University of Herfordshire, UK 2019*

A **natural** plant **alkaloid**, derived from wild medical **plants** which is active against several pest arthropods.



What is Matrine?

What are Alkaloids?

- Any of a class of **naturally occurring** organic nitrogen-containing bases. Alkaloids have diverse and important **physiological effects** on humans and other animals. Well-known alkaloids include **morphine** [...] and **nicotine**.
- Interest in the alkaloids stems: Wide variety of **physiological effects (both wanted and unwanted)** they produce in humans and other animals.

(Source: Encyclopedia Britannica)



What is Matrine?

- Example (of) pests controlled: Aphids; Carmine spider mite; Apple & various leaf mites; Leek maggot; Grubs; Wireworms; Cutowrms; Diamondback moth; Caterpillars

Source: Bio-Pesticides DataBase, University of Herfordshire, UK 2019



BPDB: Bio-Pesticides DataBase

Matrine is applied against insects (Insecticide)



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What is Matrine?

- Example (of) applications: Glass house crops; Crucifers
- Efficacy & activity: Matrine-based biopesticides have demonstrated acaricidal and insecticidal activity in both field and laboratory studies.

Source: Bio-Pesticides DataBase, University of Herfordshire, UK 2019

Crucifers: f. ex. **mustard** varieties, **rapeseed** varieties, **radish** varieties, also **cabbage** varieties, **brussel** sprouts varieties and **broccoli** varieties



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What is Matrine?

- Status according to EC Regulation 1107/2009
→ **Not approved.**
- Known to (be) used in the following country: China

Source: Bio-Pesticides DataBase, University of Herfordshire, UK 2019



What is Matrine?

- **Mode of action:** Acts on insect pest **central nervous system** causing breath inhibition and motion imbalance. Curative and preventative.
- **Substance source:** A natural plant agent, derived from wild medical plants, such as the roots of *Sophora flavescens* leaves of *Pterocarya stenoptera* and essential oils from leaves of *Platycladus orientalis*

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Source: *Bio-Pesticides DataBase, University of Herfordshire, UK 2019*



BPDB: Bio-Pesticides DataBase

What is Matrine?

The “Food and Agriculture Organization of the United Nations (FAO) classifies Matrine as **pesticide** (<http://www.fao.org/3/a-i4362e.pdf>)



Food and Agriculture
Organization of the
United Nations

RAP PUBLICATION 2015/01

What is Matrine?

List of registered pesticides

Pesticide active ingredients registered in Asia

■ = registered, approved

EU Status: 0 = not approved; P = pending; N = not plant protection product

WHO Class: IA, IB, II, III; O = obsolete; FM = fumigant

Pesticide	WHO Class	PIC	POP	EC Status	Bangladesh	Cambodia	China	DPR Korea	India	Japan	Lao PDR	Malaysia	Mongolia	Myanmar	Nepal	Pakistan	Sri Lanka	Thailand	Viet Nam	Sum Asia
Lindane (gamma-HCH)	II	■	■	0				■												1
Linuron	III			■			■	■	■	■						■			■	6
Liuyangmycin																			■	1
Lufenuron				■		■	■		■	■		■		■	■	■	■	■	■	11
Magnesium phosphide	FM			■			■		■		■	■		■		■		■		7
Malathion	III			■	■	■	■	■	■	■	■	■		■	■	■		■	■	13
Maleic hydrazide	U			■		■	■	■	■	■										3
Mancozeb	U			■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	14
Mandipromid?					■															1
Mandipropamid	U			■		■	■		■	■						■			■	6
Maneb	U			■			■	■		■		■		■			■			6
Manzeb										■										1
Matiram														■						1
Matrine					■		■						■	■					■	5
MCPA (methyl chlorophenoxy acetic acid)	II			■	■		■	■	■	■		■				■	■		■	9

What is Matrine?

Maximum residue levels are set in China for Matrine:

Date: 3/31/2017

GAIN Report Number: CH17016

China - Peoples Republic of

Post: Beijing

China Releases New Maximum Residue Limits for Pesticides in Food

Report Categories:

FAIRS Subject Report

Approved By:

Lisa Anderson

Prepared By:

FAS Staff

What is Matrine?

Maximum residue levels are set in China for Matrine:

4.190 Matrine

4.190.1 Major purpose of use: pesticide.

4.190.2 ADI: 0.1 mg/kg bw.

4.190.3 Residue definition: Matrine.

4.190.4 Maximum residue limit: Shall comply with provisions in the Table 190.

Table 190

Food Category/Name	Maximum residue limit, mg/kg
Vegetables	
Head cabbage	5*
Cucumber	5*
Fruits	
Pear	5*
*The MRL is the temporary limit.	



Conclusions

So what ?

- **Matrine is a naturally occurring substance (alkaloid)**
- **Matrine is applied against insects**
- **Applied for a huge variety of crops (in particular vegetables) against aphids and many other insects**
- **Not approved in the EU (Reg. 1107/2009) but applied in China**
- **(FAO) classifies Matrine as pesticide**
- **In China, Maximum Residue Levels are set for Matrine (head cabbage, cucumber and pear)**



AGENDA

What is Matrine?

Why is Matrine an issue also for the organic food market?

Current level of discussion(s)



Matrine: Why an issue (also in organic)?

- The following information provided, refers to a presentation of Mr. Renzo Moro held during a workshop in Podgorica (Montenegro) in September 2018.
- Title of the workshop: Fake plant protection products – Inspection and controls
- Mr Renzo Moro introduced himself as civil servant at the ICQRF (Department of Central Inspectorate for fraud repression and quality, Italy)
- The ICQRF: Enforcement authority under the Italian Ministry of agricultural, food, forestry and tourism policies (Mipaaf)

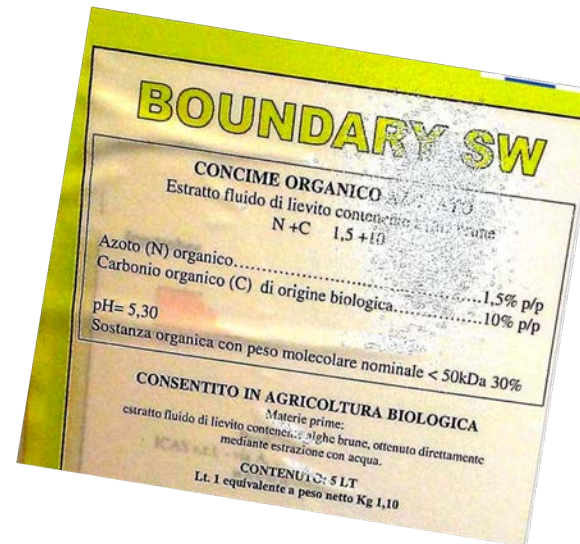
Matrine: Why an issue (also in organic)?

- In July 2013: The presence of the prohibited active substance in fertilisers and plant strengthening products (corroborants) became an issue (touched by FederBio, Federazione Italiana Agricoltura Biologica e Biodinamica).
- In 2014, ICQRF (Department of Central Inspectorate for fraud repression and quality, Italy) intensified investigations.



Matrine: Why an issue (also in organic)?

- In Italy, Matrine-containing fertilisers / plant strengthening products were placed on the market **also (or even in particular) for organic farmers.**
- Also in Greece and Cyprus, Matrine containing fertilisers / plant strengthening products were identified.



Matrine: Why an issue (also in organic)?

Background:

- Matrine formulations were sold from China to Italy - labelled as a "plant extract / natural fertiliser" to undergo (stricter and more cost intensive) border controls for **plant protection products**.
- Also the cost intensive registration of Matrine according to Reg. 1107/2009 (approval of active pesticide ingredients) was bypassed.

FRAUD ALERT

Matrine: Why an issue (also in organic)?

- These imported “plant extracts / natural fertilisers” were sold in Italy (re-packed, labelled in Italian language).
- The imported “raw Matrine formulations” also were used for including them into other fertilisers formulations sold.

FRAUD ALERT

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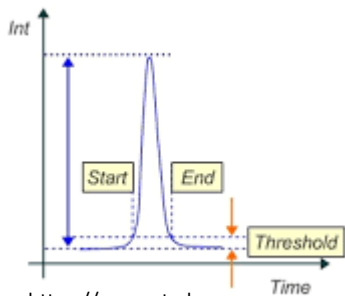
Current level of discussion(s)

Laboratory analyses of Matrine

- Application of a single residue method (SRM)) offers a possibility - as in particular the extraction and the clean-up for Matrine analyses requires additional care



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- If methods are already established in a laboratory for **alkaloid-analyses** (like f. ex. for Nicotine), the analyses of Matrine (also alkaloid) could be an option with this method.
- A modification of the QuEChERS method (f.ex. pH-adjustment etc.) might also be a possibility to cover Matrine.

Information provided by laboratory Analytica Alimentaria (Germany) and Greit (Italy)

Matrine findings, provided by laboratory Greit srl, Italy



Thus up
to 0,56%!!

Product	Matrine concentration in mg/kg
Basil and edible flowers	0,03 – 0,1
Cucumber	< 0,01
Beans (with pod)	0,025
FERTILISERS	0,01 – 5620 (!!!)
LEAVES	0,028 – 3,5 (!)
Strawberries	0,015 – 0,04
Lettuce	0,02
Mandarins	< 0,01
Apples	< 0,01 up to 0,014
Blueberries	< 0,01 up to 0,15

Matrine findings, provided by laboratory Greit srl, Italy

Product	Matrine concentration in mg/kg
Sweet Peppers	0,01 up to 0,071
Pears	0,016 up to 0,024
Peaches	0,16
Tomatos	< 0,01 up to 0,018
Baby leaf	0,029 up to 0,16
Rosemary	0,35
Rocket salad	0,018 up to 0,14
Spinach	0,01
Soil	< 0,01



Current level of discussion(s)

Due to findings of Matrine also in food products, discussions about the evaluation of Matrine findings are fuelled.

○ Questions discussed are:

- Which food products are actually affected by Matrine? → Additional monitoring data is necessary.
- Can Matrine be considered as a “pesticides” - and thus the requirements of Reg. 396/2005 have to be applied?
- How to evaluate Matrine findings in organic products?
- Access to reliable toxicological data necessary to evaluate human health risks.





Thank you

Merci

Grazie

Gracias

Danke

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