TAIEX WORKSHOP ON INSPECTION PROCEDURE: FAKE PLANT PROTECTION PRODUCTS - INSPECTION AND CONTROLS

AGR 64363

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Expert: Renzo Moro
Few words about me and my Department

Mr Renzo Moro, civil servant at the ICQRF, an Italian abbreviation which stands for Department of Central Inspectorate for fraud repression and quality safeguarding of agro-food products. The ICQRF is an enforcement authority under the Italian Ministry of agricultural, food, forestry and tourism policies (Mipaafft) responsible for preventing and repressing any breach of European and Italian laws relating to:

a) agro-foodstuffs productions, (from farming to food processing industries as well as at their wholesale and retail stage);

b) farm supply products (seeds, feeds, fertilizers and plant protection products).
Carrying out Official Controls according to (EC) Reg. No. 882/2004 (Reg. UE 625/2017 from December 2019) by means of Inspections, Chemical Analyses and, if the case, working as Police under the coordination of a Public Prosecutor.

The ICQRF is also the Italian *ex officio* authority for the protection of PDO and PGI products (Reg. 1151/2012), the Italian authority in the wine sector, Food fraud contact point (Reg. 882/2004)
…..the ICQRF is in charge of:

- Imposing monetary or other sanctions as result of inspection or analyses findings
- Authorizing private or public control bodies for certificating foodstuffs as PDO, PGI and Organic
- Supervising the activities of the aforementioned private or public control bodies
Head of ICQRF

At central level, the Department consists of two Directorates-General.

At local level, it has 10 decentralised inspection offices and 19 local units.

ICQRF has also its own laboratories network, comprising 6 chemical laboratories.
Practical examples of fake PPPs

“Mela Stregata (haunted apple)”

“Alga Avvelenata (poisoned seaweed)/SILVER AXE”
Police operation: MELA STREGATA (haunted apple)
Matrine: hidden danger for unaware consumers
What is matrine?

Sophora flavescens (Ku Shen)

MATRINE plant extract
The substance we will talk about is MATRINE, an alkaloid extracted from the roots of the legume "SOPHORA FLAVESCENT", whose marked phytoiatric action is known and demonstrated in different parts of the world.

This product, not allowed in Europe because it was not authorized and not tested, managed to skip a complex network of controls only because it was identified as "plant extract".
Not always what is natural is good for man and the environment

To find out the impact that certain active substances have in agriculture, whether they are natural or synthetic extracts, studies should be carried out to test their effectiveness, toxicity and impact on the environment.
Step 1: The investigations by the ICQRF identify the companies producing these formulations.

Step 2: From June 2014 to February 2015 seized more than 60 tons of these products passed off as fertilizers, corroborants or bio-stimulants for a total wholesale value of over one million euros but that would have yielded 3.5 million at retail.

And July 2013 FederBio reports to the institutions of biodynamic preparations, corroborants, bio-stimulants and fertilizers with a prohibited active substance.
THE WEAK POINTS OF THE SYSTEM

The operation **haunted apple** has highlighted three weaknesses that producers of technical means would exploit to their advantage, to bring back from the window what governments and associations leave the door
PPPs (fungicides, herbicides and insecticides), due to their dangerousness and toxicity, are subjected to a very strict preliminary authorization and verification process Reg. 1107/09.

The same "Matrine" to be marketed in Europe as such should be subject to the same certification process.

Fertilizers and all other agricultural substances other than PPPs which are also often chemical substances, are regulated by different regulations (reg. 2003/2003 and others)
1) DEFICIENCY OF THE LAW

- PPPs (Reg 1107/09)

- Fertilizers (Reg 2003/2003)
Authorizations placing on the market
Plant protection products can be placed on the market and used only if they have been authorized.

Authorizations for emergency phytosanitary situations (Article 53 Reg. 1107/2009)
Registering and marketing a fertilizer is simpler:

Send to the MPAAFT (COSVIR XI, Central Plant Protection Service) a series of information (the description of the content of the product and of the production process).

The COSVIR XI examines all the documentation sent by the producer before giving the ok to the insertion of the register that, then, is equivalent to an ok to the commercialization.

In Italy there is a Register of Fertilizers and a Register of Fertilizer Manufacturers.
Always with a self-certification procedure we proceed to register the fertilizers allowed in organic farming.

Among the indications to be reported, the procedure includes the list of raw materials (organic), characteristics and origin.
**Corroborants** include those substances that are not classified as fertilizers or even phytosanitary, as they do not involve particular risks even if they have positive effects on plants.

They are in fact food products such as **vinegar or oil**, the common **bicarbonate**, **propolis** and **lecithin** or others, such as **lime**. The biodynamic preparations are also among the corroborants.
For these products, on the other hand, sales are provided without any authorization from the Ministry of Health pursuant to d. m. n. 18354 / 2009 provided that:

- their use does not cause harmful effects on human and animal health or on the environment;

- they are registered in a corroborant list drafted and periodically updated by the MiPAAFT.
- 200 million euros for chemical ones
- 4 million euros for organic ones

-FERTILIZERS
-CORROBORANTS

- Description of the content production process
  -(D.M. 17 Luglio 2012 11175)

MATRINE
Vegetable extract
The European food safety agency EFSA publishes a report on the residues of crop protection products in food every year. And in this Italy is good. According to the National Plan remaining in 2017, the samples that provided irregular results for the presence of residues were a total of 39, equal to 0.09% of the total samples analyzed 44.108.

However, among the active ingredients sought for food related to the residues of plant protection products is not expected to find the matrine was not provided.
Farmers are easily cheated because the product is sold as an "extract of plant origin" and therefore biological and with a strong ability to improve the plant's defenses.

The reference sales sector in fact was the organic one where farmers, in order to have products allowed in organic farming but safe and that give good results, are willing to pay something extra, unaware of what really contained the product.
Because of the cliché that a plant extract can not damage the environment and exploiting regulatory deficiencies, it was possible to import from abroad and market products based on substances of which little or nothing is known about the effects on the soil, the water, human…..

This is the case of: MATRINE FRAUD
Matrine is part of the large family of "botanicals pesticide", those products of plant origin that contain active substances with a phytoiatric action.

These products, once tested and registered, are considered by current legislation to be the same as any other plant protection product.
MATRINE: Botanicals Pesticide

In literature, the "Matrine" is an alkaloid molecule of natural plant origin, extracted from the roots of the species Sophora flavescens, a legume plant of Asian origin.

This particular phytiatric action of the Matrine is recognized and scientifically demonstrated in the countries where the matrina is used and authorized.

The alkaloid Matrine in fact (secondary plant metabolite such as caffeine, nicotine, morphine, strychnine) as all the alkaloids shows a marked pharmacological or toxicological activity.

**Percentages range from 0.05% to have a 2.5% fungicidal action for an Insecticide action.**

Sophora flavescens (Ku Shen)
In China, Matrine is the leading biopesticide molecule registered as an insecticide and fungicide.

It should be noted that the same list of botanical pesticide also includes those most commonly used in EU (Piretrine, azadirachtin) and also **some prohibited due to the strong environmental impact and the absence of selectivity** (rottenone, nicotine).
Biopesticide Development in China

Agrow's guest author Shyou Han traces the development and prospects of biopesticides in China

Matrine
Rotenone
Tropical Leguminose (Derris elliptica, Lonchocarpus utilis, etc.)
Nicotine
Tropical Leguminose (Derris elliptica, Lonchocarpus utilis, ecc.)

Azadirachtin
Neem tree (Azadirachta indica)

Piretrine
(Tanacetum cinerariifolium)

(pag. 17 newspaper  Agrow World crop protection news – Biopesticides acquire mainstream status).
RESEARCH and SCIENTIFIC PUBLICATIONS

this is abundantly supported by various scientific publications and articles, in which we can appreciate the consolidated experimentation regarding the phytoiatric effects of the molecule "Matrine"
The nematocidal effect has been studied since 1991 in Japan, as can be seen from the scientific publication in the journal J. Agric. Food Chem. IQQ13, 9, 189-191 - "Nematicidal Activity of Matrine and Its Derivatives against Pine Wood Nematodes".

Nematicidal Activity of Matrine and Its Derivatives against Pine Wood Nematodes

Kazuhiko Matuda, Kazuhina Yamada, Mikiko Kinura, and Masaaki Hamada
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The nematicidal activity of matrine and its derivatives isolated from the rhizome of Sophora flavescent, was examined against the pine wood nematode (Bursaphelenchus xylophilus). The nematicidal activity of matrine, which is one of the major alkaloids of the plant, was poor. However, sophocarpine, one of the unsaturated derivatives of matrine, had strong nematicidal activity against nematodes; another unsaturated derivative, sophoratine, had no activity, but it was less than that of sophocarpine. These results suggest that the degree of unsaturation in the 6-lactam ring of matrine-type alkaloids is important to nematicidal activity.

INTRODUCTION

The pine wilt disease is a very serious problem affecting pine trees (Pinus densiflora and P. thunbergii) in Japan. The disease is caused by the pine wood nematode (Bursaphelenchus xylophilus), spreading with the vector beetle (Monochamus alternatus). One method of controlling the disease is to kill or suppress the parasitic nematode, but no effective and practical control by chemicals has so far been established.

A variety of lupin alkaloids have been isolated and their structures characterized (Figure 1). Some have biological activities against plants, microorganisms, and insects (Wink, 1983, 1984a,b; N-Methylketones 6) and arargyrine 6), isolated from the root of Sophora flavescent, are nematicidal toward the pine wood nematode (Matuda et al., 1989). In that study, the crude fraction containing matrine (1) and sophocarpine (2) was found to be less active against the nematodes than that containing the cytokine-type alkaloids 6 and 6. However, matrine shows biological activity against human parasite nematodes (Terada et al., 1982), and therefore matrine and its derivatives may also have nematicidal activities against B. xylophilus. A few matrine-type alkaloids were consequently isolated and their nematicidal activity against pine wood nematodes was examined.
Recent scientific studies in China published in the month of January 2014 in the Bioresource Technology magazine demonstrate the effect of the rotiferous (protozoan parasites of algae) of Matrine, combined with other active principles of plant extraction (e.g., Celangulin extracted from the species Celastrus angulatus - Toosendanin extract from the species Melia toosendan).

**Efficacy of binary combinations of botanical pesticides for rotifer elimination in microalgal cultivation**

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*University of Chinese Academy of Sciences, Beijing 100049, PR China*

**HIGHLIGHTS**

- Binary toxicity of celangulin, matrine and toosendanin for rotifers were studied.
- Celangulin/matrine and celangulin/toosendanin at a 1:1 ratio exhibited synergism.
- Celangulin/toosendanin (1:9) exterminated rotifers and allowed microalgae survival.
- Application of celangulin/toosendanin (1:9) reduces biocide dosages and the cost.
- Celangulin/toosendanin (1:9) is a potential practical rotifer control combination.

**ABSTRACT**

Binary interactions of celangulin, matrine and toosendanin against the rotifer Brachionus plicatus were studied. Types of interactions (agonism, synergism and addition) were dependent on the biocides themselves and their ratios in combinations. Mixtures of matrine/toosendanin mainly produced addition owing to their similar modes of action aiming at the nervous system. Combinations of celangulin mixed with matrine or toosendanin at 1:9 exhibited synergism, which is attributed to the interference of matrine or toosendanin with the detoxification enzymes of celangulin. Both the synergistic combinations were inappropriate for rotifer extermination in *B. plicatus* cultivation owing to the high phototoxicity resulting from the absence of cell walls. However, the celangulin/toosendanin (1:9) mixture decreased rotifer reproduction without damaging cells of *Chlorella* and *Nannochloropsis*. Application of frequent, low doses of celangulin/toosendanin (1:9) mixture also reduced the dosage of biocides, thereby reducing the cost of exterminating rotifers, and indicating a considerable practical application in microalgal cultivation.
There are also scientific studies in China related to the aphidicidal effects of Matrine, reported in the publication in the scientific journal Zhongguo Zhongyao Zazhi, dated November 1, 2013 entitled "Population dynamics and control techniques of aphids on honeysuckle (Article)".
Indian researcher in the publication "Acute toxicity of Matrine containing biopesticide kethrin on a freshwater fish, Labeo rohita (HAMILTON)" - the toxicity of the a.s. Matrine contained in the plant protection product called Khetrin towards freshwater fish.

The experiment was carried out by injecting in the breeding tanks a very common fish in the country, the Labeo rohita, certain quantities of matrine.

Demonstrating that doses above 0.2% can kill. And many of the fertilizers or biopesticides based on this natural extract contain in solution from 0.3% up. In this case, more than half of the specimens in the tanks - about 20 - would not have survived.
There are clear laboratory tests carried out on horticultural products (peppers, lettuce and strawberry), and the residual alkaloid Matrine, even after the harvest period and the period of marketing of treated agricultural products:
<table>
<thead>
<tr>
<th></th>
<th>Lettuce</th>
<th>Strawberry</th>
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<tbody>
<tr>
<td>Before treatment</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Day of treatment</td>
<td>1,82 mg/Kg</td>
<td>0,39 mg/Kg</td>
</tr>
<tr>
<td>After 3 days</td>
<td>1,18 mg/Kg</td>
<td>0,30 mg/Kg</td>
</tr>
<tr>
<td>After 7 days</td>
<td>0,55 mg/Kg</td>
<td></td>
</tr>
</tbody>
</table>
SAMPLE AFTER 20 DAYS OF TREATMENT
0,07 mg/Kg
Basil grown in Sardinia, sample made in June in "organic" farm, residual found 0.03 mg/kg;

In the latter case, traces of residual MATRINE were found on cultures (basil) not treated directly with the alkaloid in question but grown on a land where previously had been produced vegetables on which the preparations based on MATRINE were applied, becoming a platform suitable for the transfer through the root system on new crops.

*Sample taken on land where they had previously been produced vegetables treated with MATRINE*
Matrine has an acute toxicity with neurotoxic activity on insects (like that given by the other naturally derived alkaloids).

Matrina in fact inhibits the activity of cholinesterase, an enzyme that cleaves acetylcholine into substances that are no longer able to transmit the nerve impulse.

This action causes the poisoning syndrome with tremors, uncoordinated movements, poor balance, intestinal disorders and death by blocking breathing.

In addition to these acute symptoms, neurotoxic compounds may cause bio-accumulation in the lipid tissues, causing chronic toxicity over time.

**Actions of quinolizidine alkaloids on Periplaneta americana nicotinic acetylcholine receptors**

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**Abstract**

BACKGROUND: Botanical insecticides do not play a major role as crop protectants, but they are beneficial in some applications. The authors investigated the actions of naturally occurring alkaloids on insect nicotinic acetylcholine (ACh) receptors (nAChRs) by evaluating their abilities to inhibit specific binding of $[^3H]$imidacloprid (IMI) to nerve-cord membranes from Periplaneta americana L. Two alkaloids were also tested for their actions on nAChRs expressed by cockroach neurons using patch-clamp electrophysiology.

RESULTS: Four natural quinolizidine alkaloids (matrine, sophocarpine, cystine and aloperine) exhibited more than 50% inhibition of $[^3H]$IMI binding at 10 μM, although other compounds were found to have no or low inhibitory activity. The rank order of potency based on concentration-inhibition curves was cystine > sophocarpine ≥ aloperine ≥ matrine. Patch-clamp analysis indicated that sophocarpine and aloperine were not agonists of nAChRs expressed in P. americana neurons, yet, at 10 μM, aloperine, but not sophocarpine, suppressed ACh-induced inward currents significantly.

CONCLUSION: Three of the four natural alkaloids tested possess structural moieties that are necessary for interaction with P. americana nAChRs. Aloperine, which possesses a unique structure and showed a distinctive dose-response curve, was found to act as an antagonist. Appropriate modifications of these alkaloids might result in novel insecticidal nAChR ligands.

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**Keywords:** quinolizidine alkaloids; nicotinic acetylcholine receptors; $[^3H]$imidacloprid; structure–activity relationships.
In several states of the world, this molecule is recognized for its real effects described above and its derived products are officially registered and marketed for use in various formulations such as insecticides, fungicides, nematocides, acaricides.

In this regard, the following examples are cited:
in China the "matrine" is registered for n. 83 formulations containing from 0.3 to 5% of matrine. On e-commerce sites (see "Alibaba") several Chinese retailers advertise the matrine with specific phytoiatric action.

This patent is followed by a scientific publication in which the explicit phytoiatric power towards aphids (Myzus persicae), mites (Tetranicus urticae), Tripidi (Frankiniella occidentalis) and lepidopterans (Pseudaletia unipunctata - Heliotis virescanti) is described in detail.
In Peru the "Matrine" is registered with a formulation called "ARANEK", soluble concentrate, insecticide and acaricide containing 0.5% of matrine and used against the following parasites:

Bemisia tabaci (Greenhouse Aleurodide), Mizus persicae (Green Aphid peach), Oligonycus punicae (Acarus), Phyllocoptruta oleivora (Citrus mite), Poliphagotarsonemus latus (Mite attacking several plant species), Panonicus citri (New red spider of citrus fruits);
In Vietnam the "Matrine" is registered with a formulation called "DOLAGAN 25EC" containing 1gr / liter of matrines and the formulation "PROSURE 100WG" containing 5gr / kg of matrine.
In Kenya, the "matrine" is registered with a formulation called "LEVO 2.4 SL" "containing 2.4% of matrine. The product data sheet, marketed by Sineria Industries LTD, identifies the product as "BIOLOGICAL INSECTICIDE" reporting the following information: "LEVO 2.4 SL is a natural derivative of the plant sophora flavesens, a medicinal plant widely used in formulations pharmaceuticals and as traditional medicine - TARGET PARASITES: aphids, thrips, lepidopterans, mite...."
In Europe Matrine is not registered as a plant protection product or any other usable chemical compound.

IT IS OWN BY THIS REGULATORY FAILURE THAT PART FRAUDS.
WHERE IS THE ADVANTAGE?
The operation "**Mela Stregata/haunted apple**" "**Alga Avvelenata/SILVER AXE**" has also tried to shed light on the reasons that push certain companies and certain dishonest entrepreneurs to import these products not allowed in Europe and to pass them off for fertilizers, biodynamic or corroborating preparations.

Initially, we asked ourselves where the economic advantage was and **whether the companies were aware of what they were buying.**
On e-commerce sites (see "Alibaba") matrine is widely publicized with its specific phytoiatric action.

Almost all the ads come from India and China. However, among the announcements of sellers of matrina sold as "PESTICIDE", you can also find those ads that sell it as "plant extract" without giving further specifications or even worse as "FERTILIZER".
Based on this misleading classification, a dishonest entrepreneur who intends to introduce this active ingredient into Europe, bypassing the controls, does not buy the matrine declared PPP because it would be immediately blocked at the border.

However, you can easily contact a Chinese company, which complacently sends you the desired amount of Matrine simply declaring it as a "natural fertilizer". This is in fact what emerged from the inspections and searches in the offices of the companies investigated, where the correspondence between Italian and Chinese firms was found, in particular the Beijing Multigrass Formulation Co., Ltd China - which certified that the products sold at Italian companies were "natural fertilizers"
<table>
<thead>
<tr>
<th>Marks Quantities and Descriptions</th>
<th>Weight</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.6% VEGARD AS Fertilizers of Natural Origin, HS Code 310100</td>
<td>Net weight: 10000KGS, Gross weight: 10400KGS</td>
<td>PACKING: IN 1000L TANKS</td>
</tr>
<tr>
<td></td>
<td>TOTAL: 10TNAKS</td>
<td></td>
</tr>
</tbody>
</table>
This declaration verifies that MATRINE within Boundary is 100% natural.
Furthermore, from the verification of the Beijing Multigrass Formulation Co. Ltd website, the MATRINA product is marketed and classified as an insecticide.

On the same site the active substance MATRIN is described with the following characteristics:
Matrine

Concentration: >=60%, >=90%

Common name: Matrine
Appearance: dark yellow liquid.

Melting point: 67~69℃

Solubility: Dissolve in ethanol, chloroform, toluene, benzene, acetone. Dissolve in water, not easy in hot water.

Stability: not stable in strong light, and adding antioxidant can prevent its oxidation.

Characteristic:
High activity and broad spectrum, speedy degradation in environment and low residue and can be used in green foods. The function mechanism: Paralyse nerve center, contact poison first, then solidify albumen and stop up the air vent of insect body, finally make the insect die of suffocation; Suppress microsomal monoxygenase,; and reduce live rate and hinder growth of larva.
BOUNDARY
NO.: 14-07
MADE IN CHINA
NET WEIGHT: 1000 KGS
GROSS WEIGHT: 1086 KGS
BATCH NO.: BC140317
MANUFACTURING DATE: 14-03-17
MANUFACTURER’S CODE: 1100611018
1101ZC011
FOR INDUSTRIAL USE ONLY AND NOT FIT FOR HUMAN CONSUMPTION
So the Italian manufacturing companies were aware that what they bought was a plant protection product that the Chinese producer would have sold, on request, also as a "fertilizer".
Here are the key points that have pushed companies to dive into the business of the matrine:

1) The costs: it was enough to import from the outside Matrina-based insecticides passed off as "natural fertilizers" or "plant extracts" and, as such, are not subjected to strict preventive controls provided for plant protection products, register them as fertilizers and the game is done!
An Italian manufacturing company saves hundreds of thousands of euros in preliminary examinations and certifications for the registration of the plant protection product and its use in accordance with the law.

2) This system allowed to sell as fertilizers, biostimulants or corroborating those that are actually phytopharmaceuticals at very low prices for the final consumer who pays less VAT (value added tax) on the product: 4% against 10% of the PPPs.
Bio Pesticide

FOB Price: [Get Latest Price]

Min Order Quantity: 5000 Liters/Litres
Supply Ability: 30000 Liters/Litres per Month
Port: Kolkata, Haldia
Payment Terms: LC/T/T

Quantity: 1

Please specify your requirement here.

Recommended suppliers: If this supplier doesn't contact me, please send a request to Supplier Center within 24 hours.

I agree to share my Business Card to the supplier.

[Contact supplier] [Leave Messages]

Product Detail

Quick Details
Classification: Biological Pesticide
Status: Liquid
Purity: 100% non-toxic to non-target organisms
Place of Origin: West Bengal, India
Brand Name: TARGET

Packaging & Delivery
Packaging Details: 1 Ltr. HDPE Bottle x 18 = 10 Lit.; Box, 5 Ltr. HDPE Jar x 2 = 10 Ltr.; Box, 20 Ltr. HDPE Jar & 200 Ltr. HDPE Drum
Delivery Detail: Immediate, depending upon the order quantity.
from December 2015 to January 2016, EUROPOL was informed as the seized documents showed that the company under investigation, which imported the raw material containing the alkaloid from a Chinese company, subsequently produced, packaged and sold the product finished not only in Italy but also in Greece (Tessalonica), in Cyprus (Nicosia) and in the Republic of San Marino (Fiorentino);
FROM “Mela Stregata/haunted apple”

TO INTERNATIONAL OPERATION “Alga Avvelenata/SILVER AXE”

- Withdrawal produced from all the national territories
- Destruction / disposal of toxic waste

In the last phase, from March to July 2016, the destruction of the products seized because they fall within the category called CER 02 01 08 "AGROCHIMICAL WASTE CONTAINING HAZARDOUS SUBSTANCES".
KEOS MANTIS
The operation made it possible to identify people who internationally traded organic farming products (fake PPPs and PPPs like Fertilizers), with various violations of Italian law, art. 444 of the c.p. (trade in harmful food substances), in art. 515 of the c.p. (fraud on the market) and art. 517 of the c.p. (sale of industrial products with false signs).

• The activity allowed to seize, and destroy as toxic waste, over 11,840 kilograms of harmful products containing the active substance "MATRINE", sold as organic fertilizers, stored at 397 retailers, and to confirm the marketing of over 42,000 liters of toxic alkaloids for a total retail value of over 5,000,000 euros.
Some 360 tonnes of illegal or counterfeit pesticides were seized in Europe as the result of Operation SILVER AXE III, an annual operation coordinated by Europol with the support of the European Anti-Fraud Office (OLAF)........
Thank you!

QUESTIONS?