Uncommon Formulations for Tailor-made Applications

12th FAO/WHO Joint Meeting on Pesticide Specifications (JMPS) and 59th-CIPAC-Meeting, Symposium
Athens, Greece June 16, 2015

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on behalf of ECPA, Specifications Expert Group

Uncommon Formulations

- Agenda -

Introduction		
Examples:	**CropLife 2-letter-code**	**Author(s)**
Baits (ready for use)	**RB**	
Smoke generators	**FU**	
Presentations in Detail		
(1) Matrix formulations for vector control NEW	**MR**	Yumiko Kozuki (Sumitomo Chem.)
(2) Gel for Direct Application NEW	**GD**	Bart Roose (Monsanto)
(3) Tree Micro Injection	**AL**	Peter Wyss & Peter Kundel (Syngenta)
(4) Forest Protection System	**LN**	Amy Dugger-Webster & Alberto Gasser (BASF)

Common Formulation Types

for tankmixes

Examples:

Liquid Formulations

EC Emulsifiable concentrate
SL Soluble concentrate
SC Suspension concentrate
ME Micro-emulsion
DC Dispersible concentrate
SE Suspo-emulsion
EW Emulsion, oil in water
OD Oil dispersion
CS Capsule suspension

Solid Formulations

WG Water dispersible granule
WP Wettable powder
SG Water soluble granules

Formulations for Seed Treatment

FS Flowable concentrate f.S.T.
ES/LS Emulsion/Solution f.S.T.
DS Powder for dry S.T.

Crude Definitions

Common Formulations	Uncommon Formulations
Standardized applications: - by Knapsack Sprayer to high-tech / high-speed / bulk / machine-based	Specific & tailor-made application systems: often manual, but highly specific devices
Widely used	Niche markets
Farming / Field Crops	Home & Garden / Specialty Crops / Personal Care / Forestry

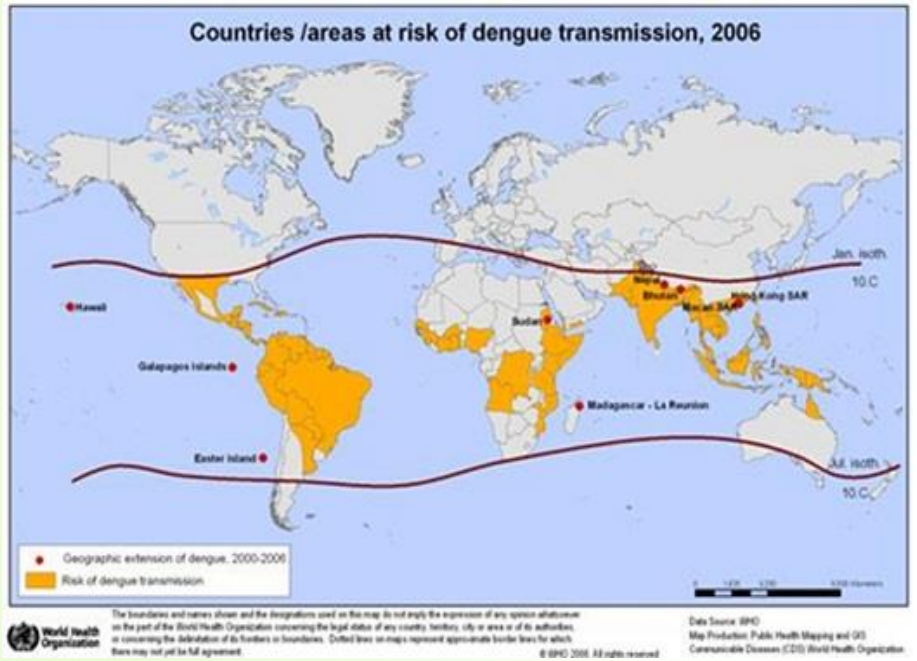
Example 1

Matrix Formulations for Vector Control (MR)

NEW Code

Vector-borne Diseases

- **Vector-borne diseases / diseases with intermediate hosts among the major causes of illness and death in many tropical / subtropical countries.**
- **Malaria, the most deadly vector-borne disease, kills over 0.5 million people annually - mostly African children under the age of five — and significantly impedes economic and social development**
- **Dengue fever and dengue hemorrhagic fever (DHF) are the world's fastest growing vector-borne disease**

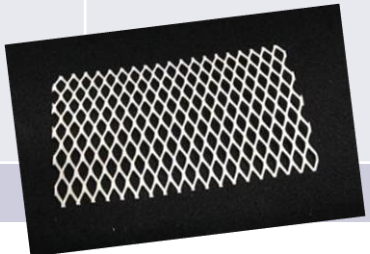


Key solution for vector control:

Vector / Mosquito Control

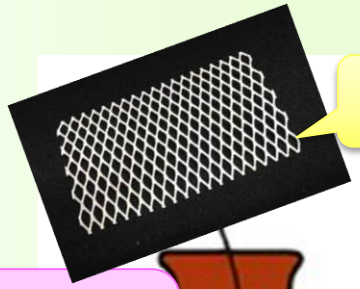
Code	Term	Definition / Formulation	Important Phys/Chem properties
LN	**Long-lasting insecticidal net**	▪ Slow- / controlled-release on netting ▪ Physical and chemical barrier ▪ 'LN' refers to bulk netting and ready-to-use products (e.g., mosquito nets)	**Wash resistance index**
MR	**Matrix release formulation**	▪ Matrix release for controlled release of active ingredients (AIs) ▪ One or more AIs incorporated into polymer resin and/or coated onto surfaces ▪ Intended for **direct application into bodies of water** without further preparation	**Release/ retention rate**

New definition of a formulation type



Application of MR Formulations

- **Used in water bodies** because *Aedes* mosquitos, which transmit dengue fever, only lay their eggs in **clean water**

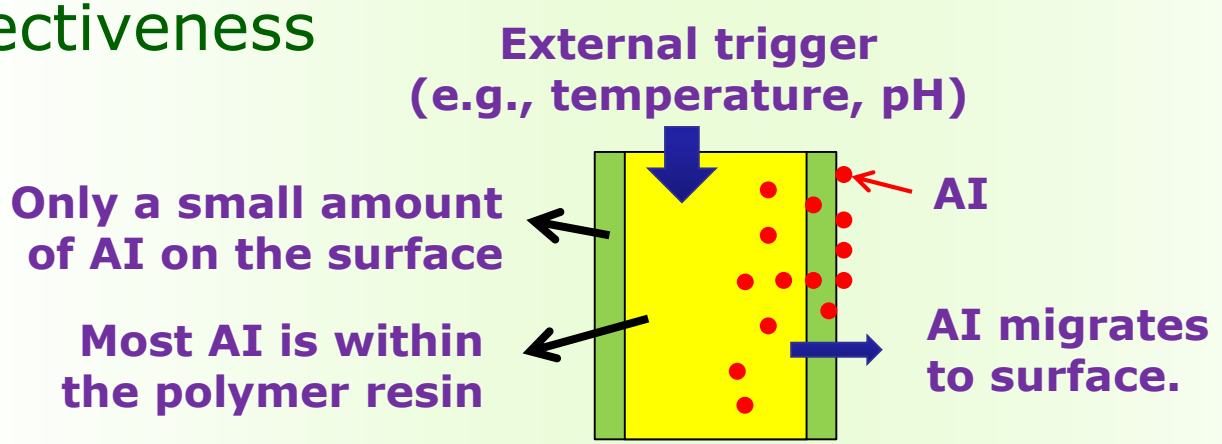


AI(s) in the MR Formulations

- MR consists of:
  - One or more AIs
  - Polymer resin
  - Necessary other formulants

Internal triggers

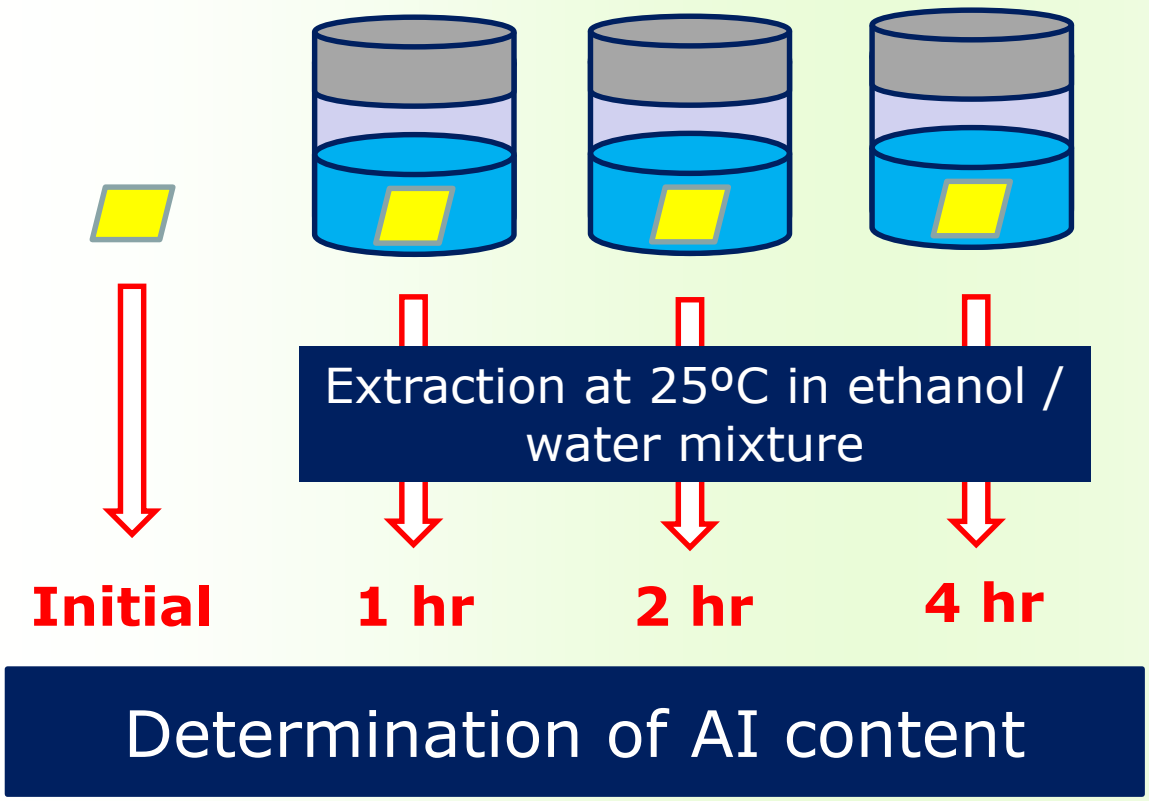
- AI(s) incorporated into polymer resin and/or coated on surfaces (e.g., LNs)
- AI(s) released slowly, providing long-lasting effectiveness



Retention Rate Test for release profile

Incorporated MR

Retention Rate Test Method



1. **MR transfered to glass bottle, and an ethanol–water mixture is added**
2. **Bottle placed upright in constant temperature**
3. **Following static extraction at three specified intervals, AI concentration determined and retention rate calculated**

- *Sumitomo will present the result of the small scale collaboration study in the CIPAC TC meeting this year.*

Example 2

Gel for Direct Application (GD)

NEW Code

Gel for Direct Application (GD)

- Gel-like formulation:
  - At least one AI
  - Structuring agent
- Applied undiluted

A touch is all it takes

Formulation Benefits

- Longer contact time
  - Reduced surfactant content
- Localized & accurate application
  - Gel sticks to the leaves
  - No dripping/run off

How to use:

Just one click

Delivers precise amount of gel

Touch the leaf

Gel sticks to leaf

Formulation Properties

- Specification guideline pending
- Relevant phys/chem properties:
  - Appearance:
    homogeneous formulation, no phase separation observed
  - Acidity/Alkalinity or pH range

Example 3

Tree Micro Injection – TMI

(AL – Any other Liquid - to be applied undiluted)

Tree Micro Injection

Background / Starting point: Increasing Problems with Tree Pests and Diseases

Processionary Moth

Tree Micro Injection

Examples of Tree Pests and Diseases

Tree Micro Injection

Examples of Tree Pests and Diseases

Horse Chestnut Leaf-Miner

caterpillars

Tree Micro Injection

Typical Spray Application on Trees:

Tree Micro Injection

Treatment of Trees - Injection Application

Tree Micro Injection

Treatment of Trees: **Injection Equipment**

Tree Micro Injection

The Formulation

- **Type**: **AL-formulation** (any other liquid); applied undiluted
- **AI**: Emamectin benzoate (e.g., 4% solution)
- **Application**:
  - Direct injection into the stem
  - 1 injection point per 5 cm DBH*
  - at approx. 1 – 3 ml per cm DBH*
- **Control**: 2 – 4 years

* DBH = Diameter at Breast Height [cm], typical values: 15–50 cm


untreated
treated

Example 4

Forest Protection Nets (LN)

Storanet®

LN in Forestry for Log Piles Protection

- **Benefits**
  - User- and eco-friendly
  - Minimal AI directly available on net surface
  - Reusable & resistant to rain and UV for up to six months
  - Packaged individually; easy to combine for large log piles

- efficient bark beetle control -

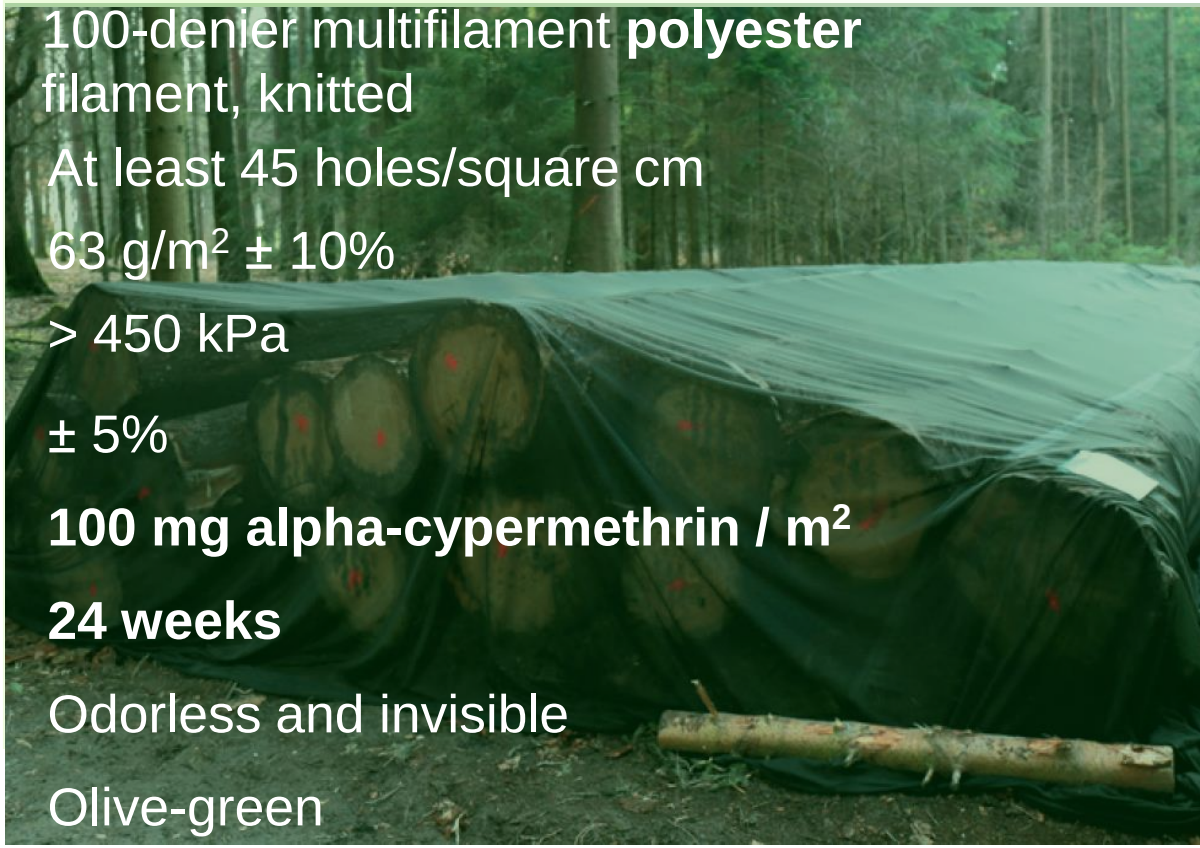
Storanet®

The Net

- Combats bark- & wood-breeding beetles in deciduous and coniferous wood

Specification:

Net material	100-denier multifilament **polyester** filament, knitted
Mesh size	At least 45 holes/square cm
Weight	63 g/m^2 ± 10%
Bursting strength	> 450 kPa
Dimensional stability	± 5%
Active ingredient (AI)	**100 mg alpha-cypermethrin / m^2**
Duration of effectiveness	**24 weeks**
Properties of AI	Odorless and invisible
Color	Olive-green



Storanet®

Active Ingredient Calculation

AI Calculation for 3 Applications on 30 m³ of Logs		
Product	**Formulation Type**	**Grams AI per 90 m³ (grams AI per m³)**
Karate® Forst	**CS**	**150** (1.66)
Fastac® Forst	**SC** *(oil-enhanced)*	**80** (0.9)
Storanet®	**LN**	**10** (0.11)

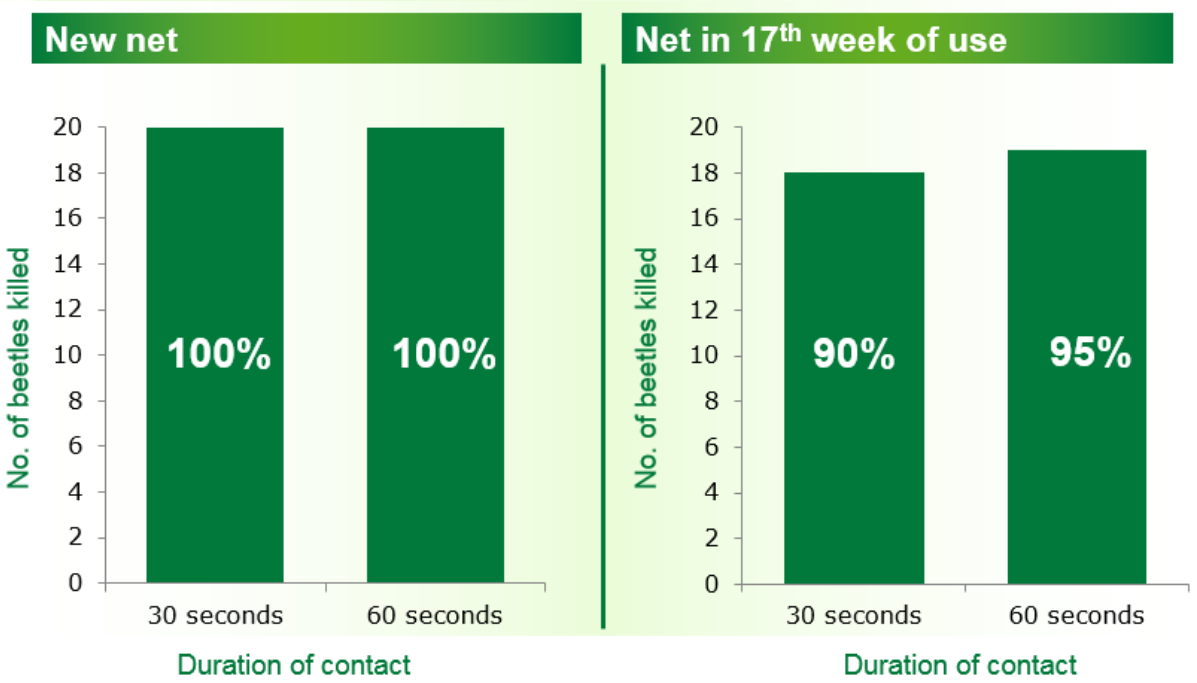
RESULT: Storanet® uses approx. 10x less AI compared to common spray applications

Storanet®

Efficacy of Net Technology

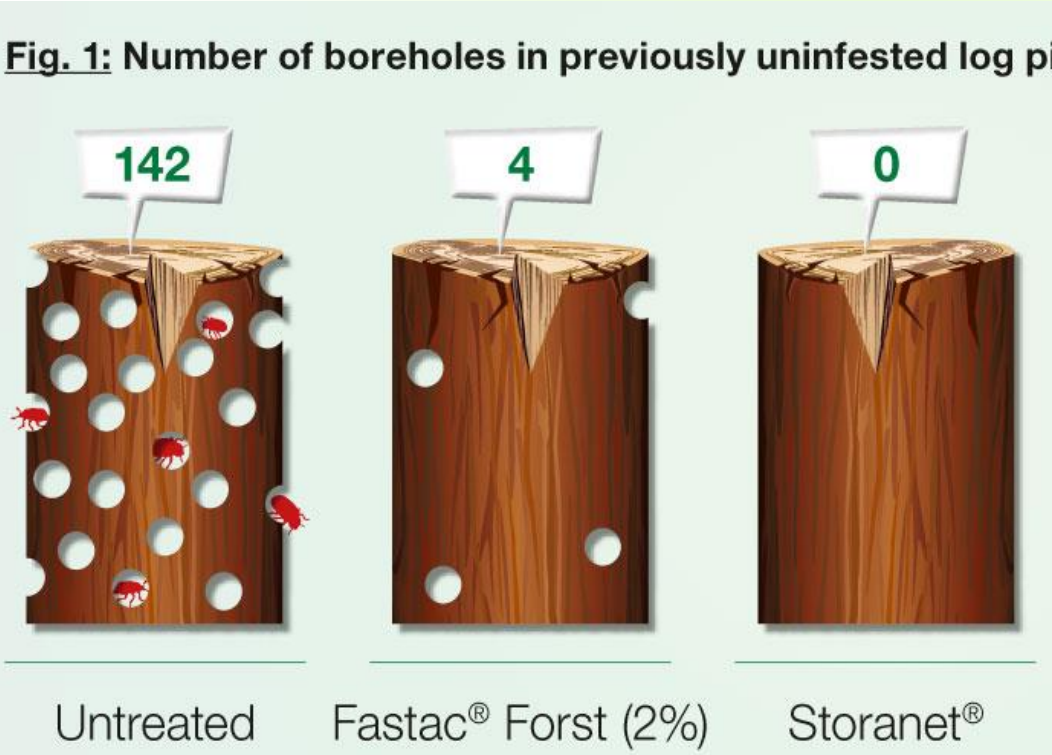
- **Trials on Mortality Rate of Beetles Placed on Net**
  - **Studied by Göttingen Forestry Research Institute**
    - **20 European spruce bark beetles placed on net**
    - **Parameters studied:**
      - **Contact times: 30 and 60 seconds**
      - **Duration of use: new net vs. use in 17th week**

Fig.: Beetles being placed on a net



Storanet®

Biological Efficacy



Efficacy Storanet® **100%**

Efficacy Fastac® Forst (2%) **97%**

…beyond Storanet®: Additional LN applications

- Trinet®: ***attract & kill*** net with pheromones
- Carifend®: stored good protection, including tobacco

Uncommon Formulations

- Summary -

- Special applications – not covered by classical formulation types – esp. for niche markets
- Many benefits, esp. due to safe applications for operators & users and lower impact to environment.
- Regulatory requirements should be appropriate – e.g. similar to *emergency uses.*

→ Reasonable balancing of benefits, costs and regulatory requirements.

Thank you
for your
attention

Back-ups

Two types of LN formulation

Active ingredient

Raw material

Mixing

AI is existing **in** the polymer resin homogeneously.

Incorporated

Spinning

Knitting

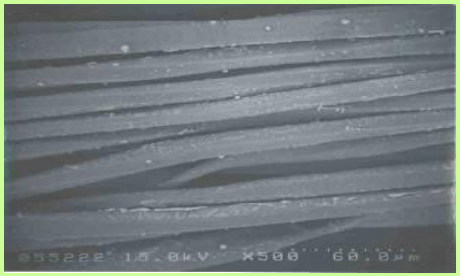
Cutting

Stitching

Product

Raw material

AI is existing **on** the surface of the polymer resin.



or

or

Active ingredient

Coated