

**Evaluation of the efficacy of a new
insecticide paint for malaria control. Part I:
Bioassay tests on different surfaces against
Culex quinquefasciatus over 12 months**

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Insecticide Paint - Cocktail

Chlorpyrifos (OP) + Diazinon (OP)
+ Pyriproxyfen (IGR)

Current widespread of **insecticide resistance** (PY)
→ even if the full effect of resistance is not known

Operational value vs. bednets & house spraying
→ even if it could have obstacles of its own

Question: Could the paint be effective **in malaria & pest control** in some settings?

- Ivory Coast (Phase I - Lab)
- Montpellier (Phase I - Lab)
- Benin (Phase II - Field)

PHASE I at LIN - Methodology

- Surface treatment & controls
- 30' Bioassays against OP resistant and susceptible *Cx. quinquefasciatus* strains
 - Immediate Mortality (at 60 min)
 - Delayed Mortality (at 24 h)
- IGR Testing against 30' Bioassays surviving females
 - Egg-laying
 - Egg-hatching
 - Mortality at each stage
- Distance Tests
 - Delayed Mortality (at 24 h)



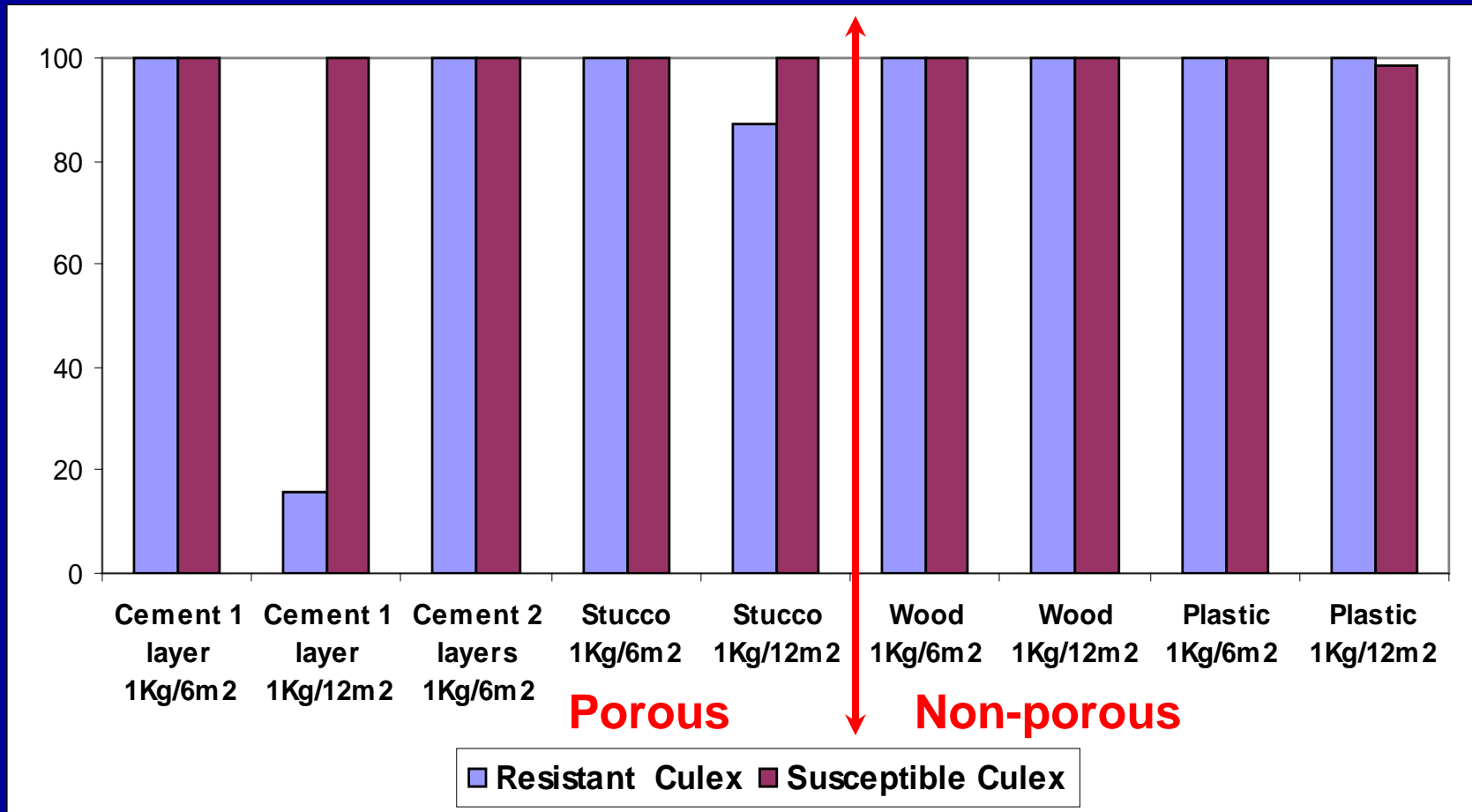
PHASE I at LIN - Results

- **Surface:** Porous vs. Non-porous
- **Concentration:** 1Kg/6m² vs. 1Kg/12m²
- **Mosquitoes used:** OP resistant vs. susceptible *Cx. quinquefasciatus* strains

Control mortality < 7%



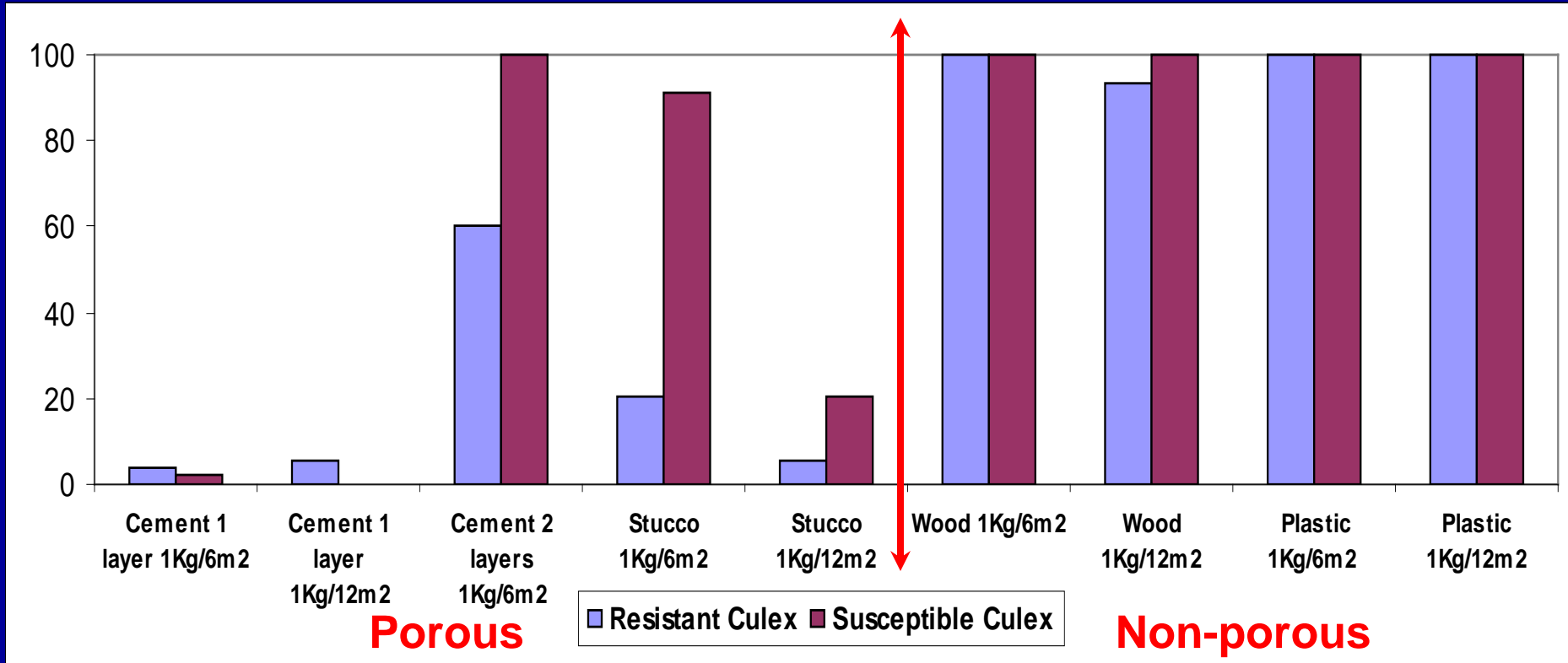
Delayed mortality at T0 months against resistant and susceptible *Cx. quinquefasciatus*



All surfaces: mortalities different from control ($p < 10^{-3}$)

Cement one layer against resistant at 1Kg/12m² ($p < 10^{-2}$)

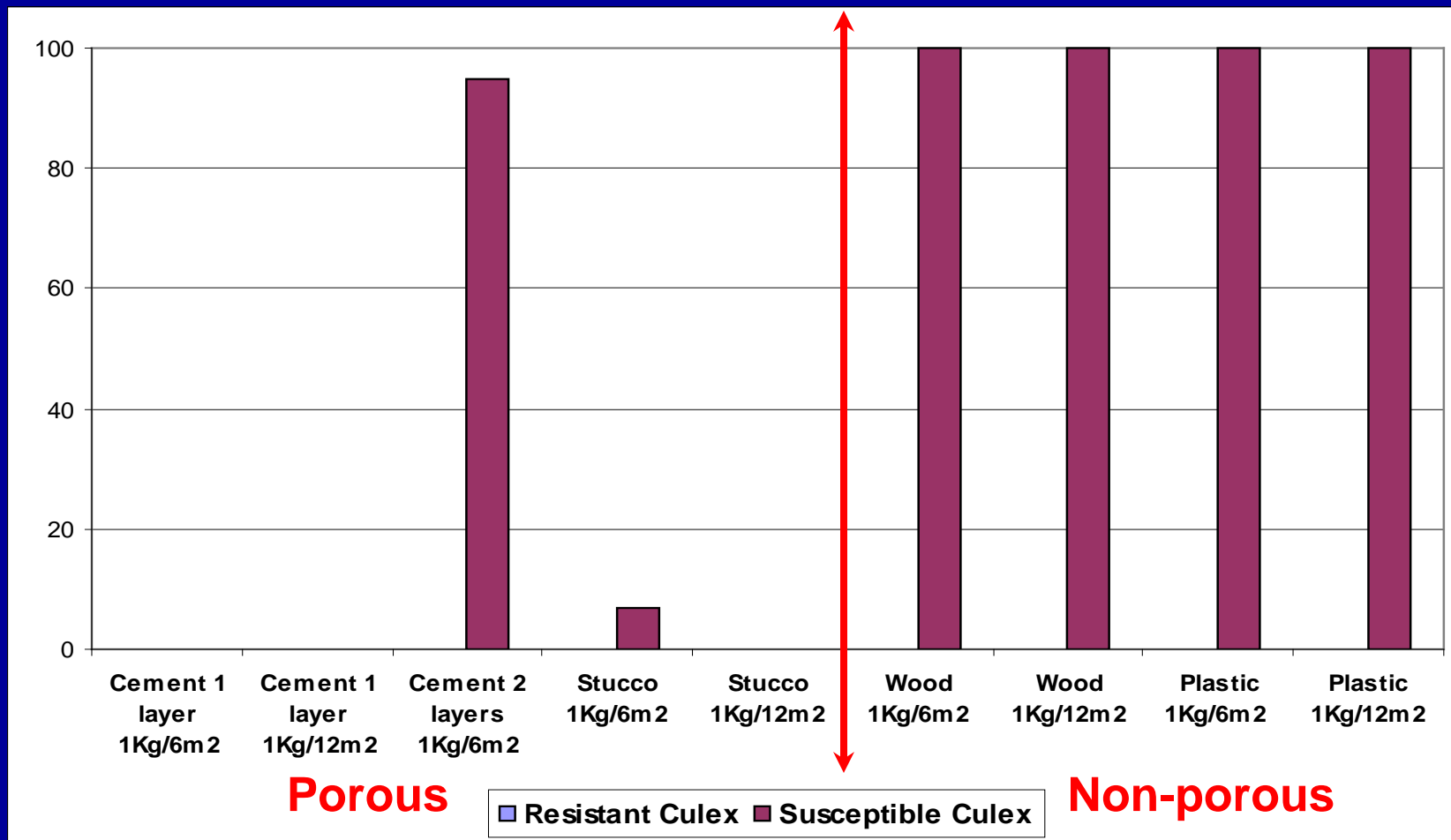
Delayed mortality at T12 months against resistant and susceptible *Cx. quinquefasciatus*



Most surfaces: mortalities different from control ($p < 10^{-3}$)
except

- cement (one layer) against resistant and susceptible *Culex*
- stucco treated at 1Kg/12m² against resistant *Culex*

Immediate mortality at T12 months against resistant and susceptible *Cx. quinquefasciatus*



Quick killing of susceptible *Culex* after one year on non-porous surfaces ($p < 10^{-3}$)

IGR testing at T0 & T9 months on cement (1 layer) against *Cx. quinquefasciatus*

T0 - Cement (n=50)	Egg number	% Egg-hatching	% Pupation	% Emergence
C1/NO Paint	2104	51,8	39,6	79,5
C2/ Paint NO insecticide	2473	48,8	40,0	85,9
Insecticide at 1Kg/12m ²	800	41,3	45,5	52,7

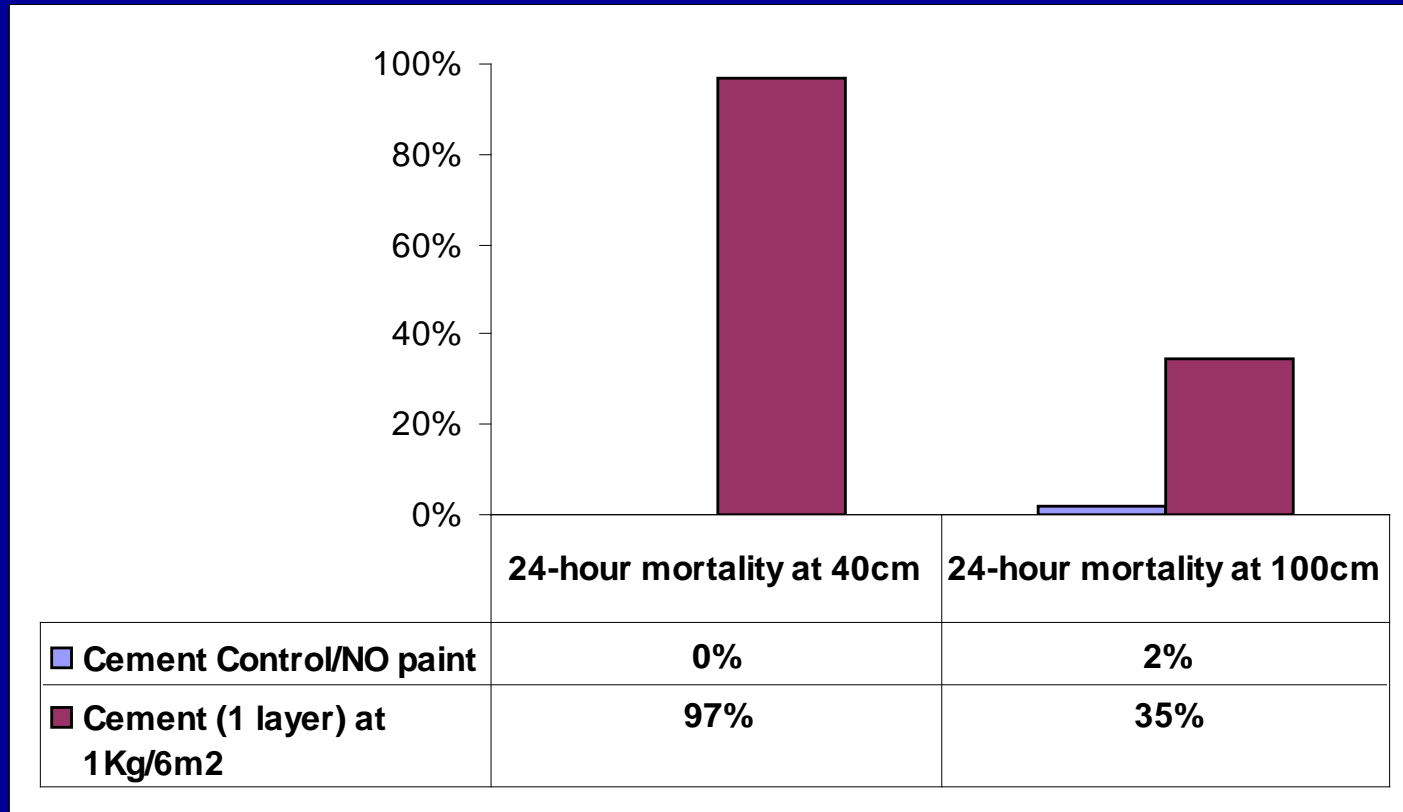
T0: Reduction in Egg number ($p < 10^{-3}$), % Egg-hatching ($p < 10^{-3}$), % Emergence ($p = 10^{-3}$)

T9 - Cement (n=30)	Egg number	% Egg-hatching	% Pupation	% Emergence
C1/NO Paint	1908	75,8	56,3	87,8
C2/Paint NO Insecticide	2002	73,1	60,0	84,4
Insecticide at 1Kg/6m ²	1216	77,5	64,6	65,9
Insecticide at 1Kg/12m ²	1156	70,9	59,9	86,6

T9: Reduction in Egg number ($p < 10^{-2}$), % Pupation ($p < 10^{-3}$), % Emergence ($p = 10^{-3}$)

Distance Tests

Delayed mortality at T0 months against susceptible *Cx. quinquefasciatus* performed overnight ($n \geq 55$)



Control vs. 40 cm 1Kg/6m²: $p < 10^{-6}$

Control vs. 100 cm 1Kg/6m²: $p < 10^{-2}$

Confirmed by Field Tests

Phase I - Findings

- High mortality on non-porous surfaces after 1 year
- Quick killing of susceptible mosquitoes on porous surfaces even after 1 year
- No marked differences between concentrations
- Longer efficacy of 2 layers vs. 1 layer
- Reduction of bio-availability on porous surface
- IGR efficacy on porous surfaces up to 9 months even when insecticide's efficacy has disappeared
- Efficacy at a distance

Future Prospects

Question: Would the paint be
an option in some settings ?

Phase II: Field evaluations in
Benin