



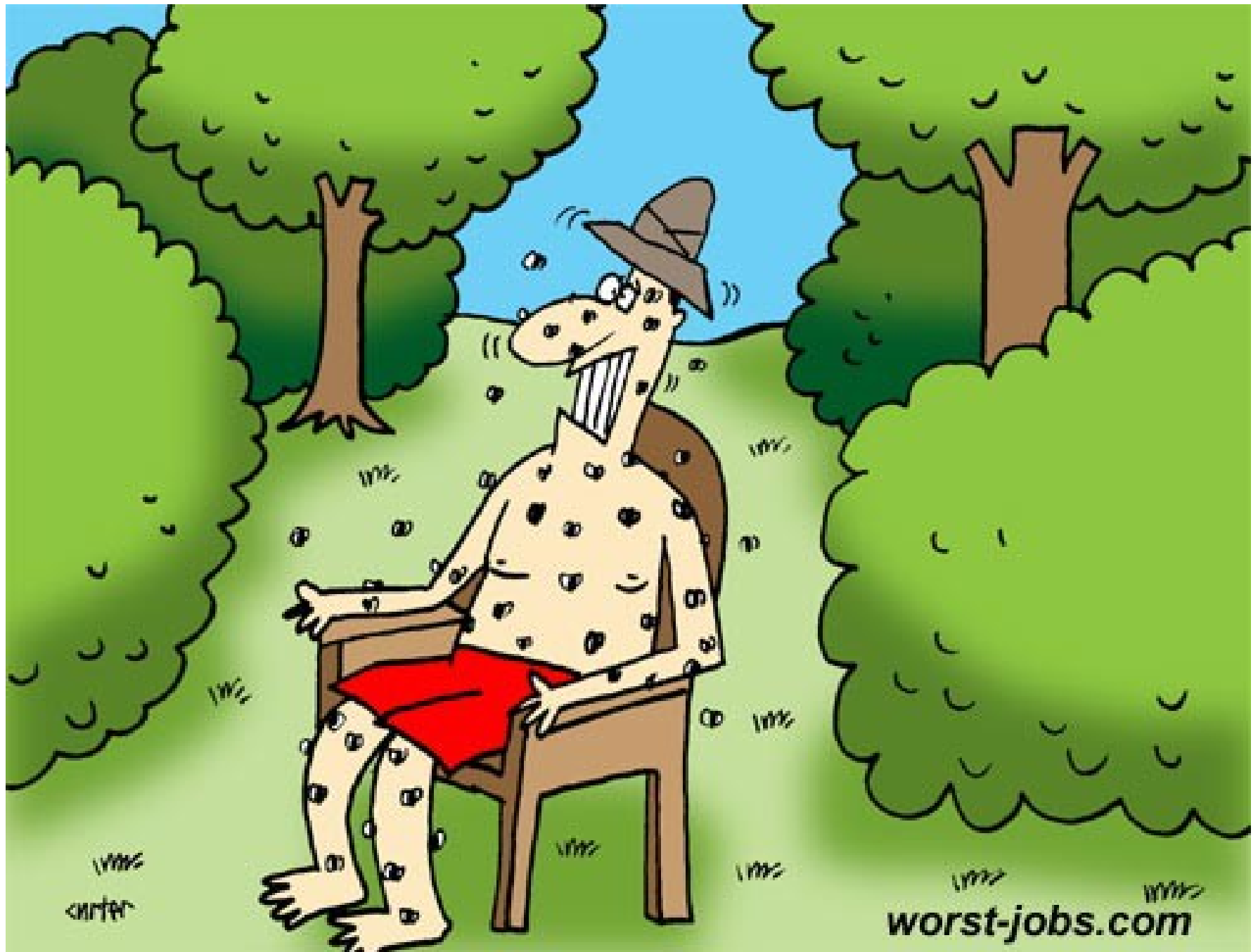
IVCC

COMBATING INSECT
BORNE DISEASE

The Innovative Vector
Control Consortium



New Tool and Technologies



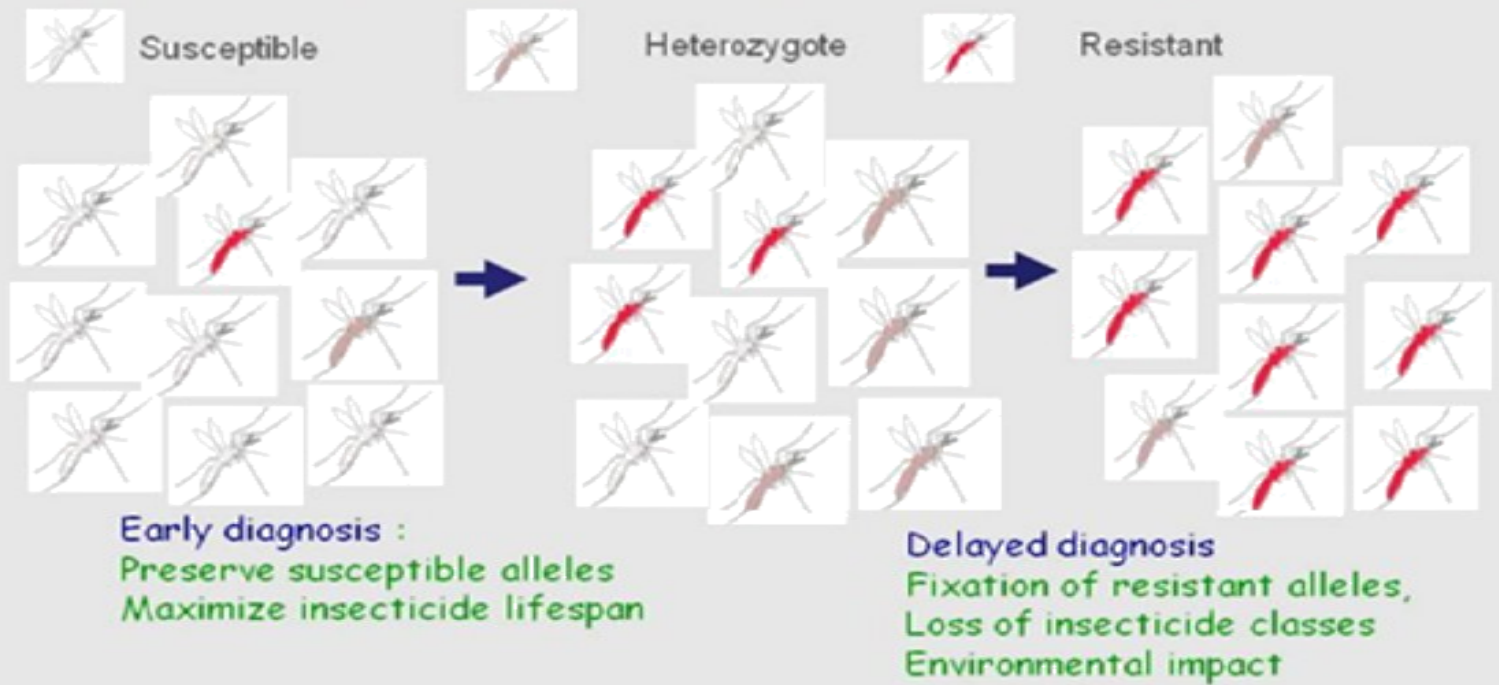
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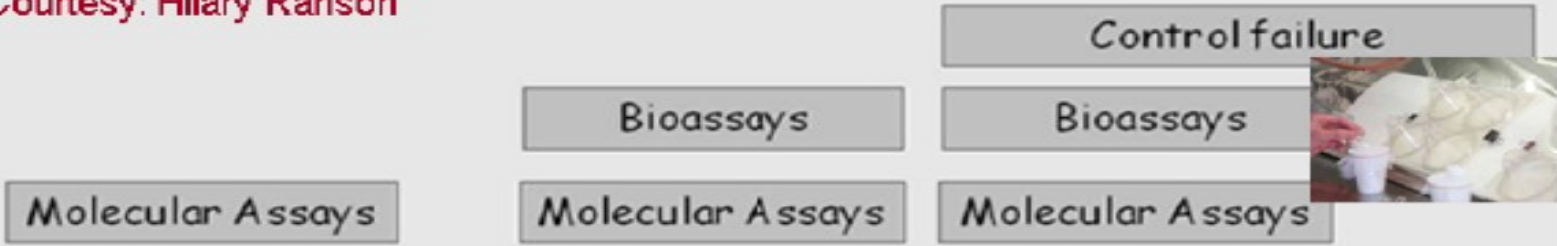
Data Loggers

- Quantitative data for actual use of interventions
- Initial data show that response to the question 'did you use a bed net last night?' in villages in the Ivory Coast had a 26% inaccuracy factor. The percentage inaccuracy increases with time.

Insecticide resistance: major threat to the control of insect vectors



Courtesy: Hilary Ranson



Resistance management - Early detection-Molecular Diagnostic tools

Markers for Resistance detection in *An gambiae* and *Ae aegypti*

Phenotype
↓
Candidate
↓
Validate
↓
Technology
↓
Field test

Phenotype populations for insecticide resistance

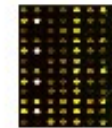
Identify candidate loci associated with resistance
Gene expression group- microarrays, qPCR
Genotyping group- association mapping

"EMPHASIS ON METABOLIC RESISTANCE"

Validate that candidates are the cause of resistance
Enzyme characterization group

Develop DEC appropriate technology for detecting the validated resistance locus

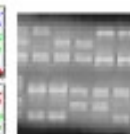
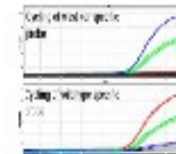
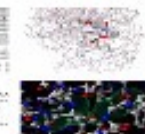
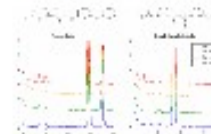
Field test the kits in DEC setting Africa, Latin America and South East Asia



• Anopheles Liston chip
• 28K genes
• 20 million bp long only
• 14Kbp, 120Kb, 100Kb
• Non-overlapping genes

Candidate gene association mapping for insecticide resistance genes in *Anopheles gambiae*

Identify SNPs in and around detox genes:
1536 plex Illumina SNP array



Vector Population Monitoring Tool: A simple DNA-based kit to rapidly screen mosquito vector populations and reliably identify the species, pathogen infection status and insecticide resistance alleles.



As - Is

To be

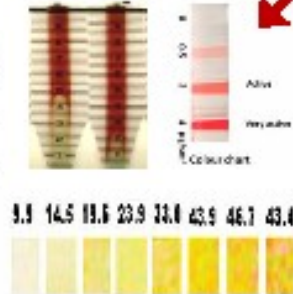


Uganda 2009



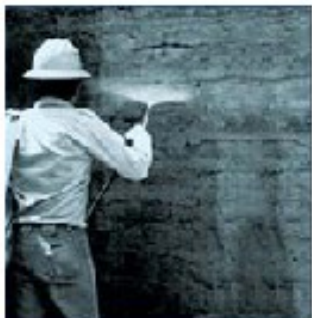
Days
Variation
Complicate
Expensive

No.	City	Area/Local	Home Surface	DOT mg/m ²
1	Kwazulu	Ophansi	14 Cement (unplastered)	48,0
2	Kwazulu	Ophansi	178 Cement (painted)	11,3
3	Kwazulu	Ophansi	178 Cement (unpainted)	75,3
4	Kwazulu	Ophansi	28 Mud (house)	17,8



Quick
Accurate
Easy
Cheap





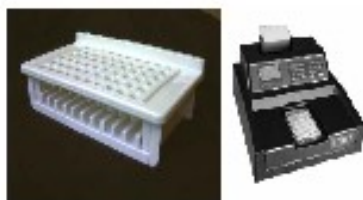
Insecticide Residual spray: Quality Assurance

The only way to check that protection is being provided by is to measure the amount of insecticide residue.

Available tools for measuring insecticides on ITM



HPLC-GS



Antibody (ELISA)

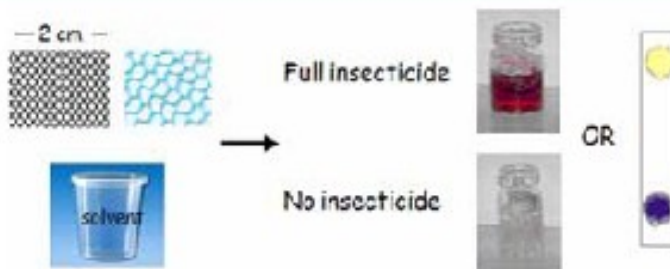


Bioassays



Expensive (>\$20) - technically demanding; skilled staff, access to lab- insectary

Demand for user friendly-
cost effective tests

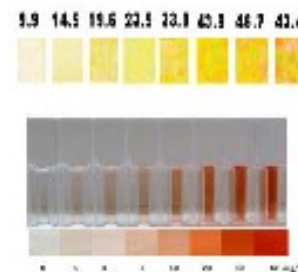
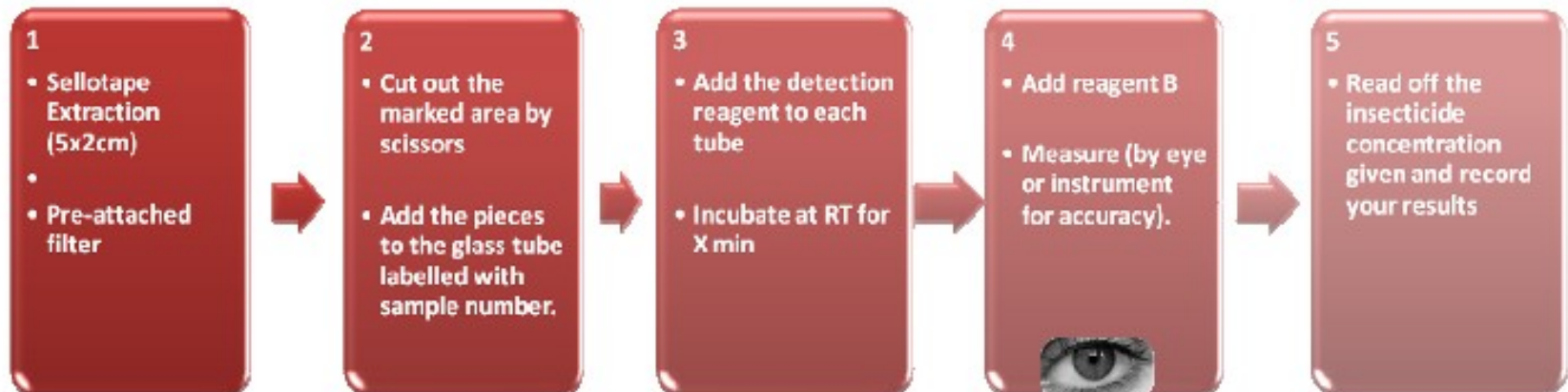


for local users: procurement tool/operational research/ support evidence-based policy

The IVCC is sponsoring the development of Simple tests for measuring insecticides in the frame of ITM application in tropics.

"Specification"
(Kit Format)

Quick
Reliable
Stable (RT or 4C, >6M)
Cheap (<2USD/test)

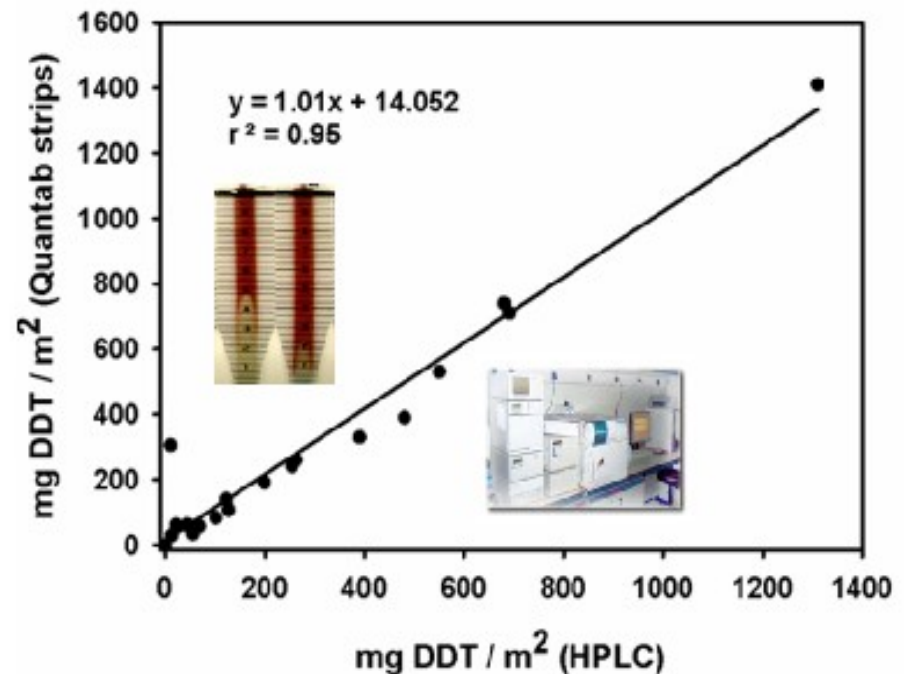


Evaluation of the GST-based biosensor “Kit” with large number of field samples (Africa and India)

Table 1. Comparison of DDT detection assays with HPLC for DDT estimation from field collected IRS adhesive tape samples

Sample	Surface	HPLC (mg/m ²)	Quantab (mg/m ²)
1	Mud	42	61
2	Mud	12	28
3	Mud	48	61
4	Burnt Bricks	10	305
5	Mud	262	259
6	Mud	680	741
7	Mud	122	140
8	Mud	21	61
9	Burnt Bricks	11	28
10	Mud	68	57
11	Mud	55	34
12	Painted	199	191
13	Cement Painted	254	240
14	Cement Painted	126	107
15	Cement Painted	101	83
16	Filter	480	390
17	Filter	690	710
18	Filter	390	330
19	Filter	1310	1410
20	Filter	420	530

Plot of data in Table 1

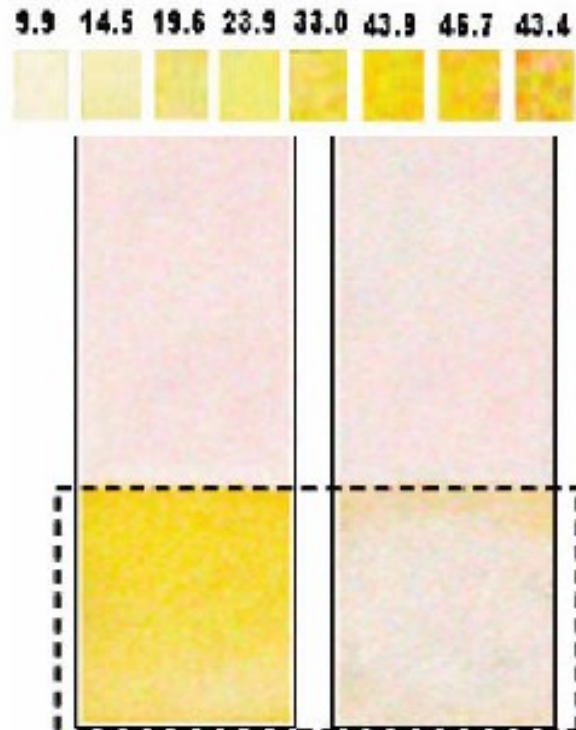


Optimisation of AChE Biosensor Format

(Dip Stick Format: enzyme and reagents immobilised on sol - gel coated sticks)



**A mixture of
ATCh and DTNB**



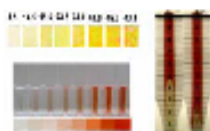
Hossain et al (2009) Anal Chem 81, 5474

Zakir et al (2009) Anal Chem 81, 9055

Information can fed back to improve decision making in the management of malaria

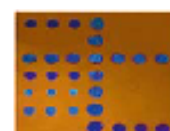
Epidemiological data etc

IQK tests



Insecticide Data
(quality of spray,
residues etc)

VPMT



Vector data (species,
resistance, infection)



Malaria Decision Support System (MDSS)

