Penetration Resistance to Insecticides in *Helicoverpa armigera*

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MECHANISMS OF INSECTICIDE RESISTANCE

- Target-site alteration
  - Altered acetylcholinesterase
  - Decreased nerve sensitivity
- Metabolic detoxification
  - Hydrolases
  - Mixed function oxidases or Monooxygenases
  - Glutathione S-transfereases
  - Dehydrochlorinases
- Reduced cuticular penetration

Penetration Resistance

- Lipophillic insecticides penetrate the cuticle by diffusing through the integument
- After crossing through this barrier are conveyed by the haemolymph to the target organs
- The mechanism of slower rate of penetration confers resistance due to higher protein and lipid content and a greater sclerotization of the cuticle
- Can be studied by tracking the movement of radioactive compounds across the cuticle
- Gene pen is responsible for the mechanism of reduced penetration

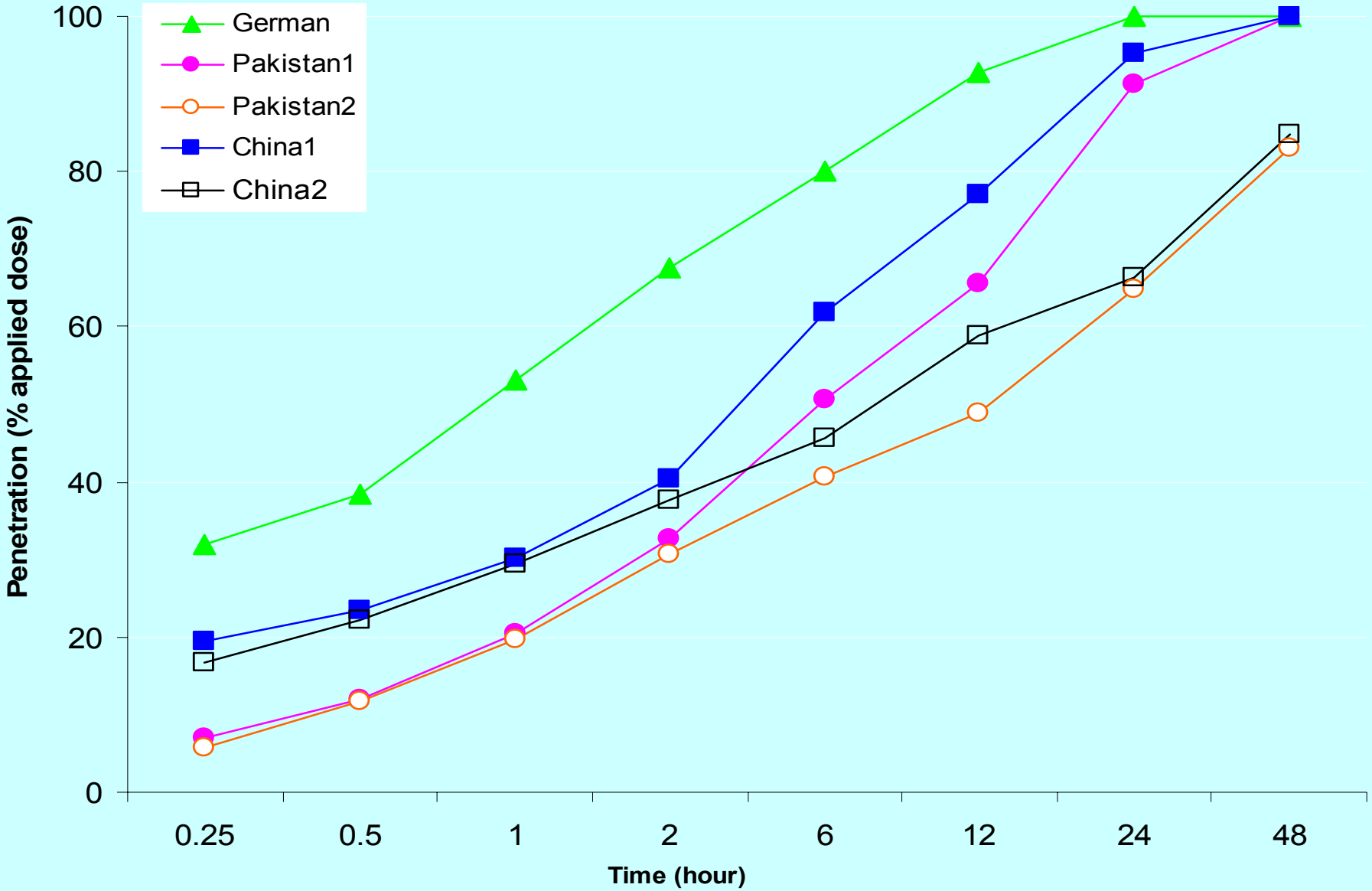
Mechanism of Reduced Penetration

- Is intensifier for other resistance mechanisms
- Produces a minor effect on its own
- Produces a major effect when other mechanisms, particularly metabolic detoxification, are present
- Holds the material outside the insect body while metabolic mechanisms work their way inside the insect body to get rid of the material penetrated
- Thus a lethal quantity of the toxicant may never accumulate at the target site
- The toxic threshold level of the insecticide may already be high due to reduced sensitivity of the target site

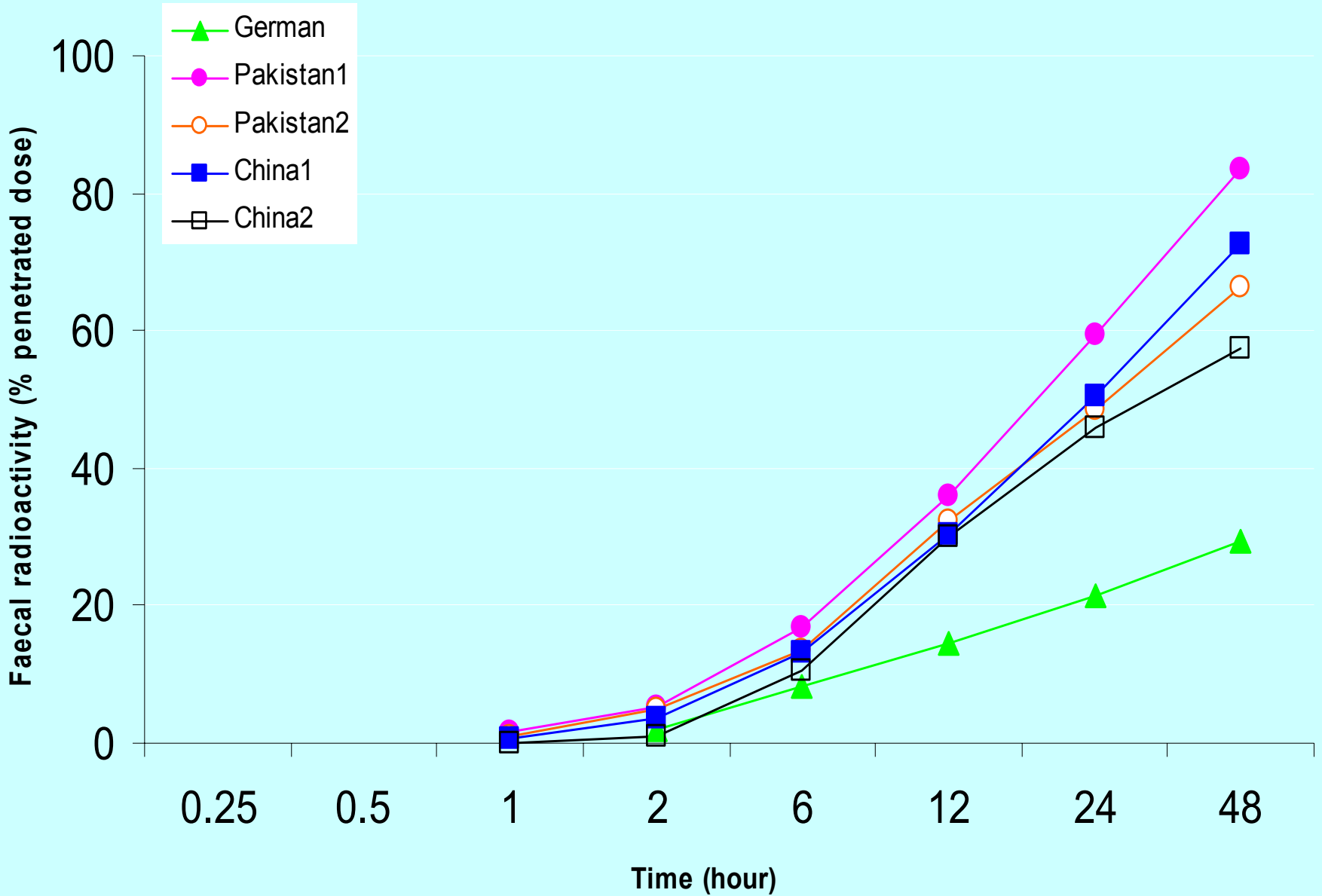
Penetration Resistance in *Helicoverpa armigera*

- Australia
- China
- Pakistan
- Thailand
- Africa?

Penetration of deltamethrin in *Helicoverpa armigera*



Excretion of deltamethrin metabolites by *Helicoverpa armigera*



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Thank You