

Challenges, environmental and health concerns of nanofertilizers

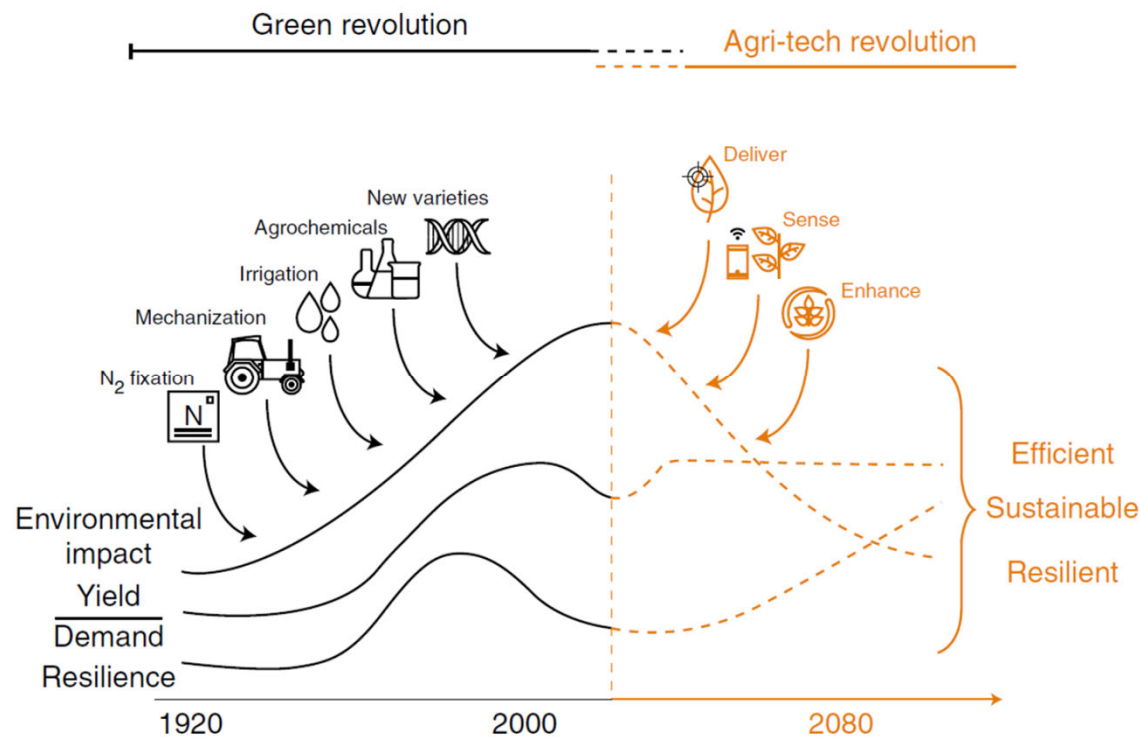
MELANIE KAH

MELANIE.KAH@AUCKLAND.AC.NZ



**THE UNIVERSITY OF
AUCKLAND**
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

Agri-tech revolution

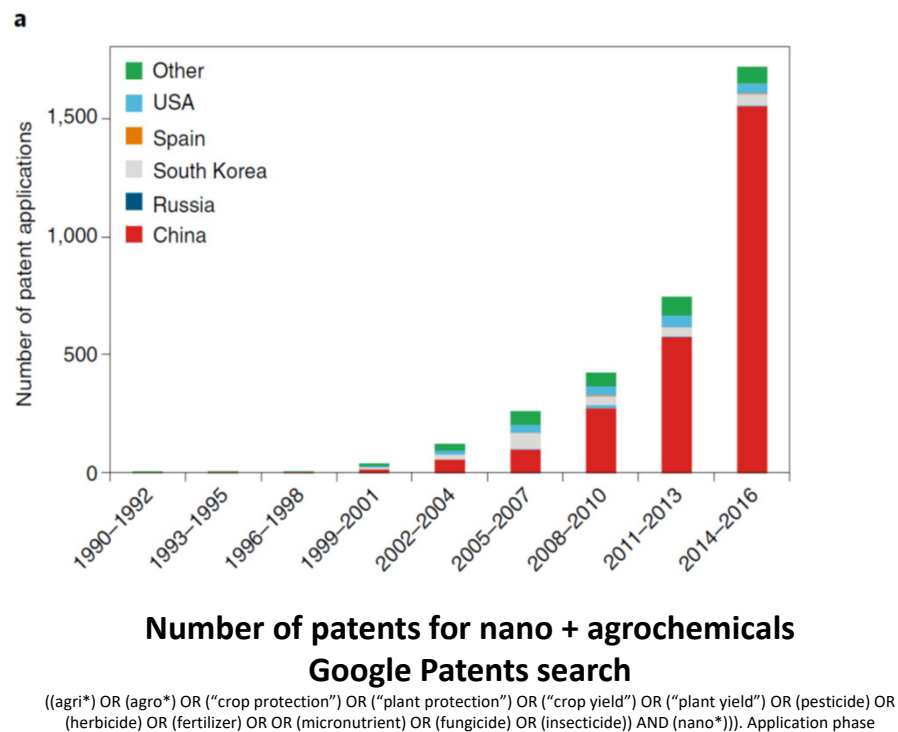


Nanomaterials <100 nm

- Can cross barrier
- Can be tuned to new functionalities



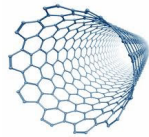
Overview on nano-strategies
to improve use of light,
water, agrochemicals



Many different types of nanomaterials

FIRST GENERATION

Carbon nanotubes



C60

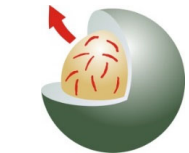


Metal/metal oxides

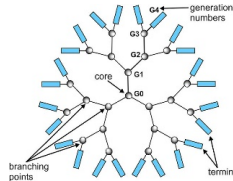
SECOND GENERATION

Often nanocarrier loaded with an active substance:

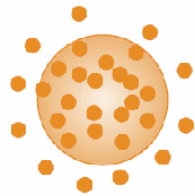
- Existing (→ reformulation)
- Novel (e.g. pheromones, RNAi, biostimulants)



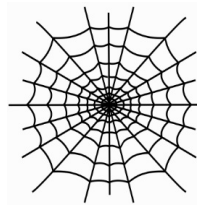
Nano-capsules



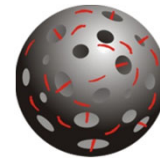
Dendrimers



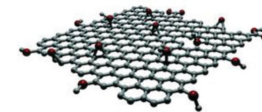
Hydrogels



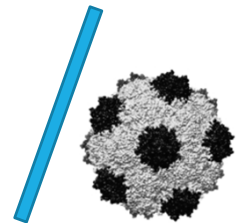
Electrospun fibers
(~spider webs)



Porous Silica



Graphene oxide



Virus capsid

Key objectives of nano-agrochemicals

More efficient application

*Stable suspensions
Homogeneous coverage
More precise target area*



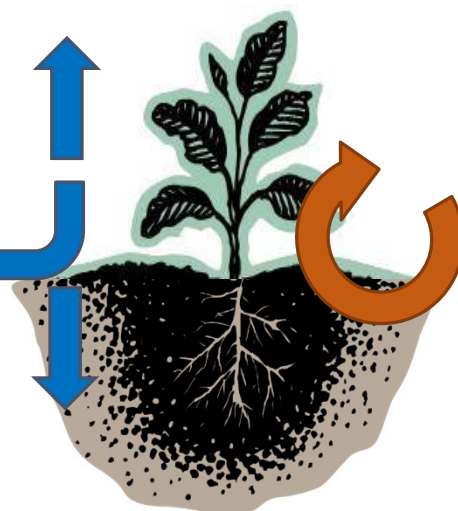
Reduced losses

*Reduced photolysis and
transport to non-target area*



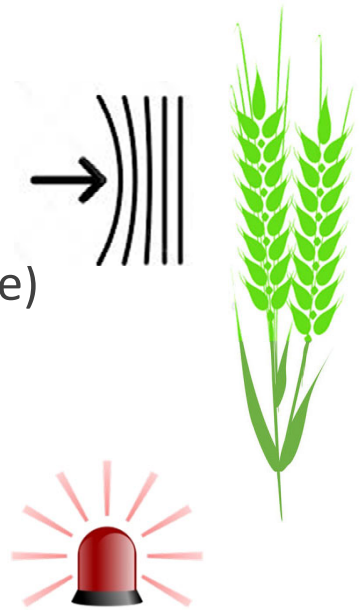
Improved bio-interactions

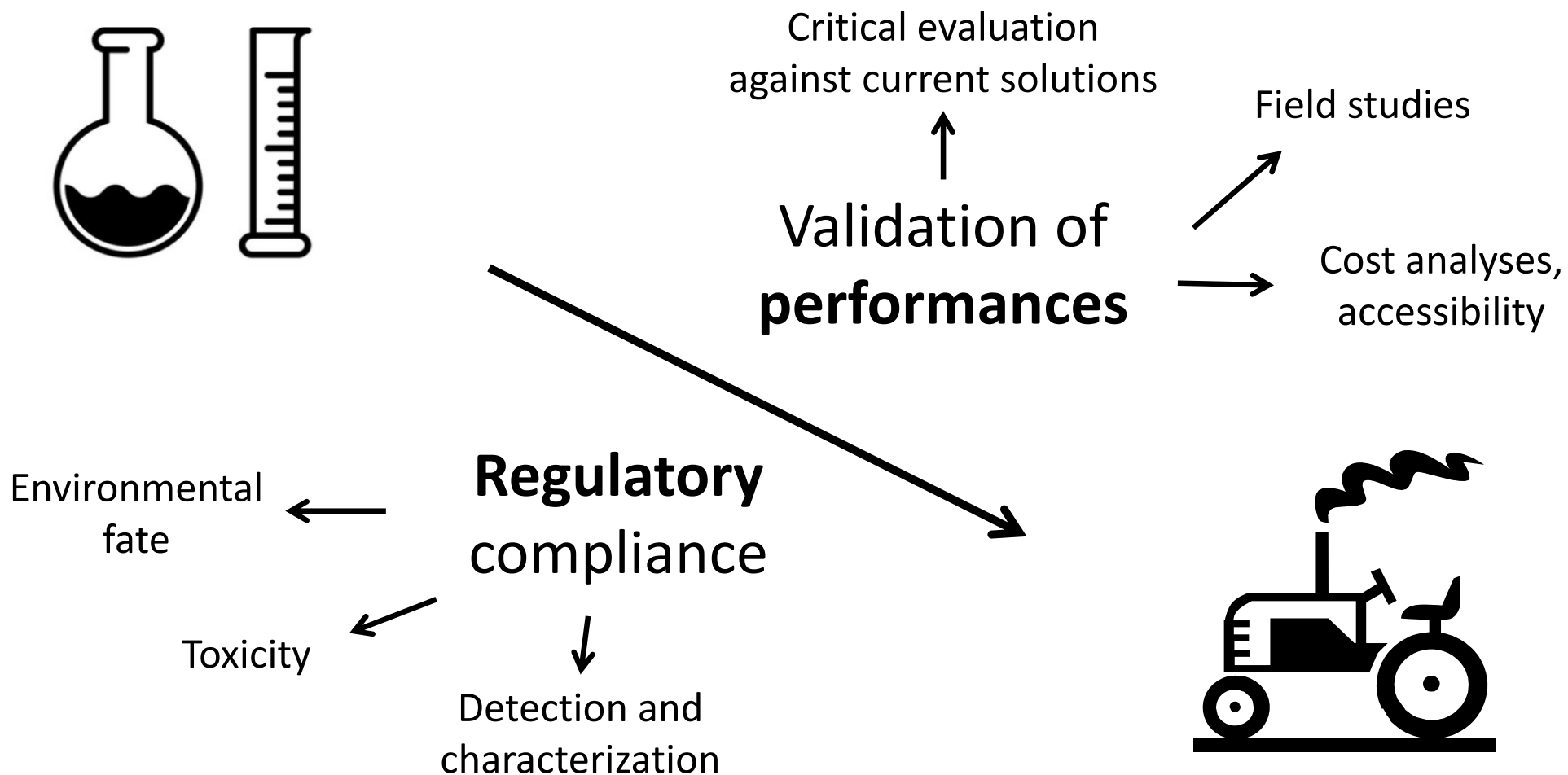
*Improved uptake
Controlled release
Target delivery*



What else can they do?

- Plant nutrition as a defence against disease
- Nanoparticles to increase **resilience** (drought, salinity, temperature)
- Crop **biofortification**
- **Nano-sensors** for plant stress (pathogens, water, nutrient status)
- **Soil** structure and health







THE UNIVERSITY OF
AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

Thank you

IF YOU HAVE QUESTIONS OR COMMENTS: MELANIE.KAH@AUCKLAND.AC.NZ