Rice intensification: could climate change interventions help African malaria elimination?

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Rice field mosquito surveillance and control

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Rice production systems, demand, water use and greenhouse gas emission

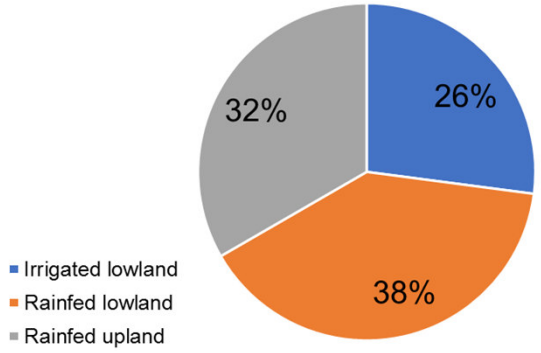


Fig 1: Rice production systems

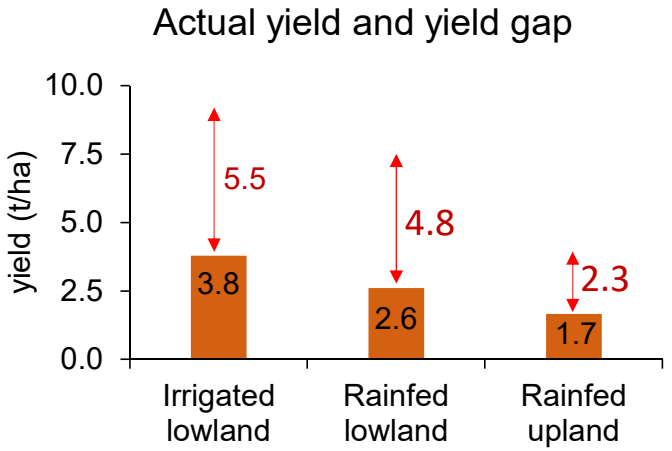


Fig 2: Yield and yield gaps

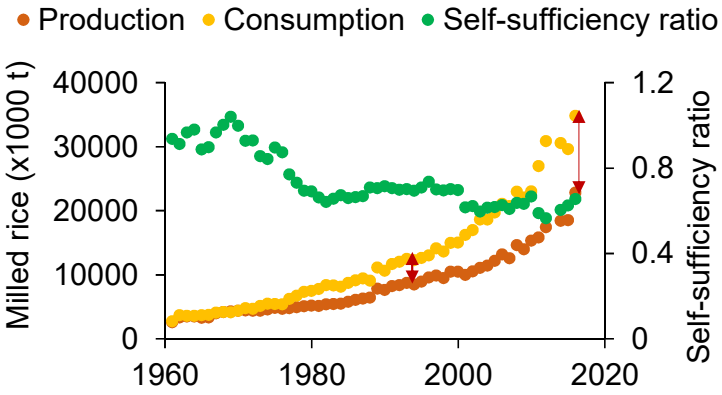


Fig 3: Production and demand in rice

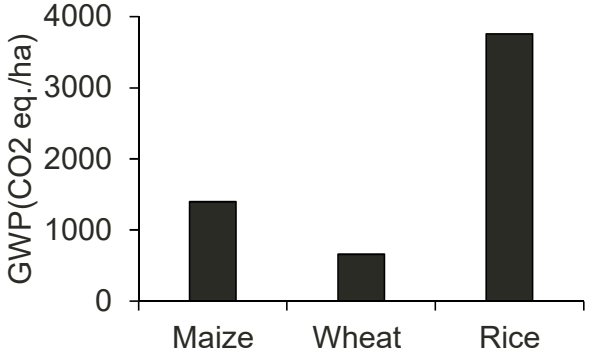


Fig 4: GWP major cereals

Rice fields – a threat to malaria elimination

Rice fields are ideal breeding sites for *An. gambiae* s.l. mosquitoes

An. gambiae s.l. are the most efficient malaria vectors

However, previous reviews conducted in 1990-2000s in East & West Africa found **the paddies paradox**:

> Rice fields generate a large amount of malaria vectors, but the amount of malaria in rice communities remains unaltered or is decreased.

Re-assessing paddies paradox: a systematic review

Entomological inoculation rate

RR 2.03 (1.02 – 4.06) p=0.045	Greater EIR in rice areas = mosquitoes are not harmless

Malaria prevalence before 2003

RR 0.82 (0.63 – 1.06) p=0.131	Rice not associated with increased malaria prevalence

Malaria prevalence after 2003

RR 1.73 (1.01 – 2.96) p=0.045	Greater risk of malaria infection in rice villages

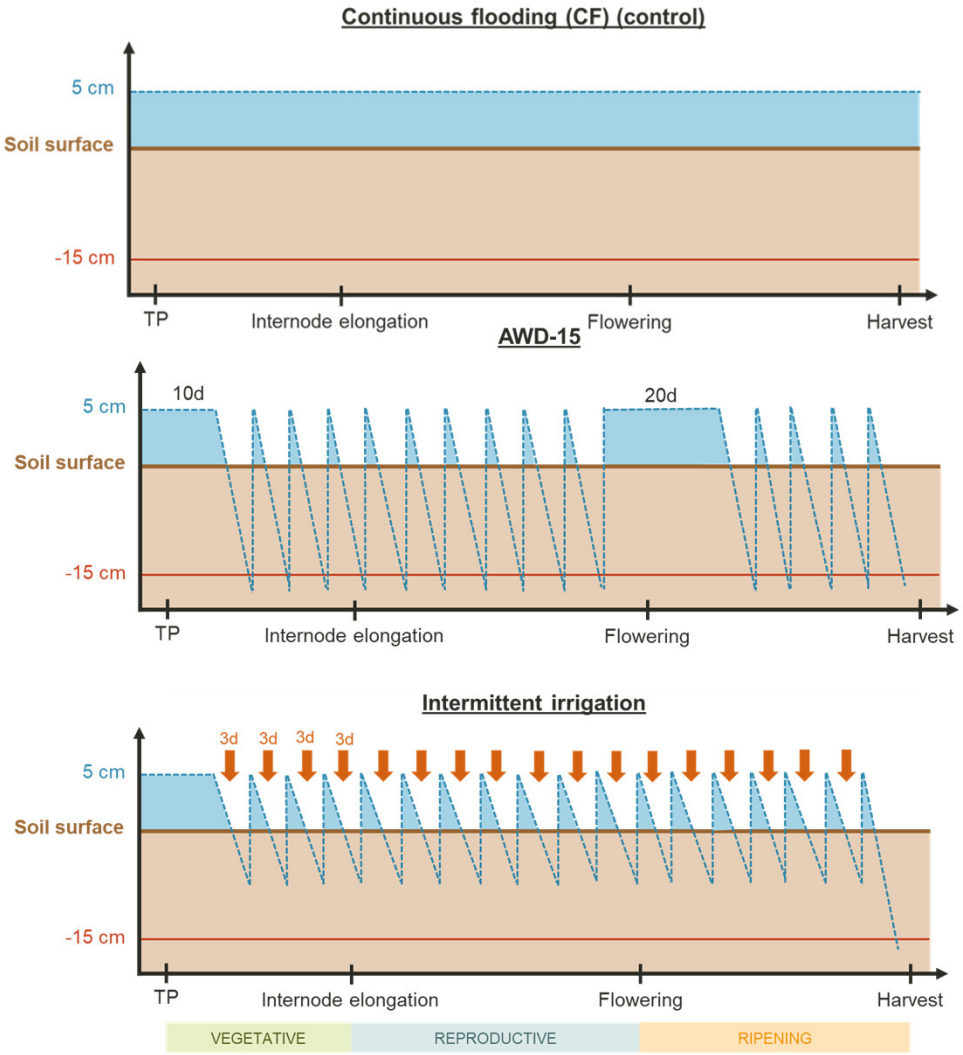
Objective

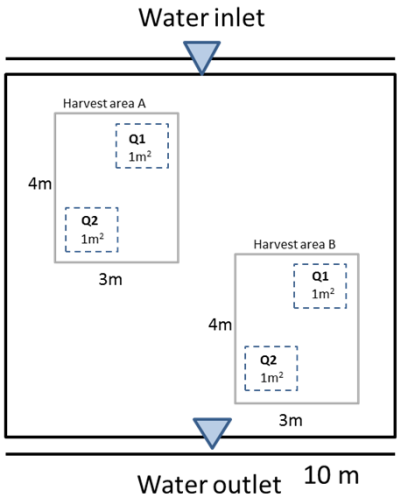
To identify rice intensification strategies that :

a. Increase rice yield
b. Reduce water use
c. Increase water productivity
d. Reduce greenhouse gas emission
e. Reduce malaria transmission potential

Experiment - Water & nutrient management

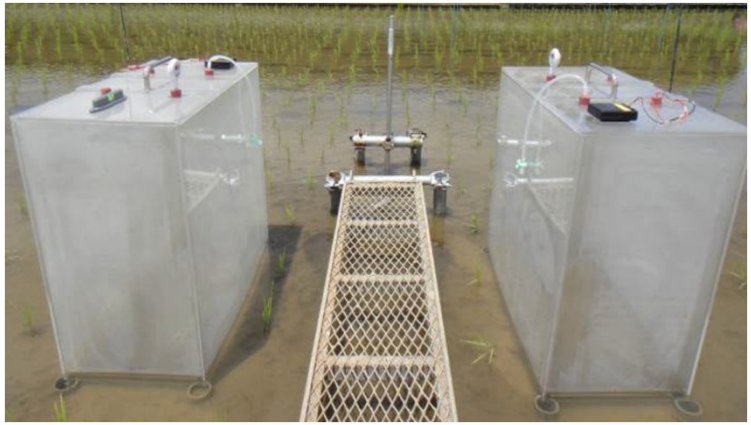
Treatment	Water management	Nutrient management
T1 (control)	Continuous flooding (CF)	Standard
T2	Alternate wetting and drying -15 (10 DAT)	Standard
T3	AWD-15 (2 DAT)	Standard
T4	Intermittent irrigation	Standard
T5	CF	No fertiliser
T6	CF	Forced drainage prior application
T7	CF, without rice cultivation	No fertiliser





Harvested areas for agronomic data collection

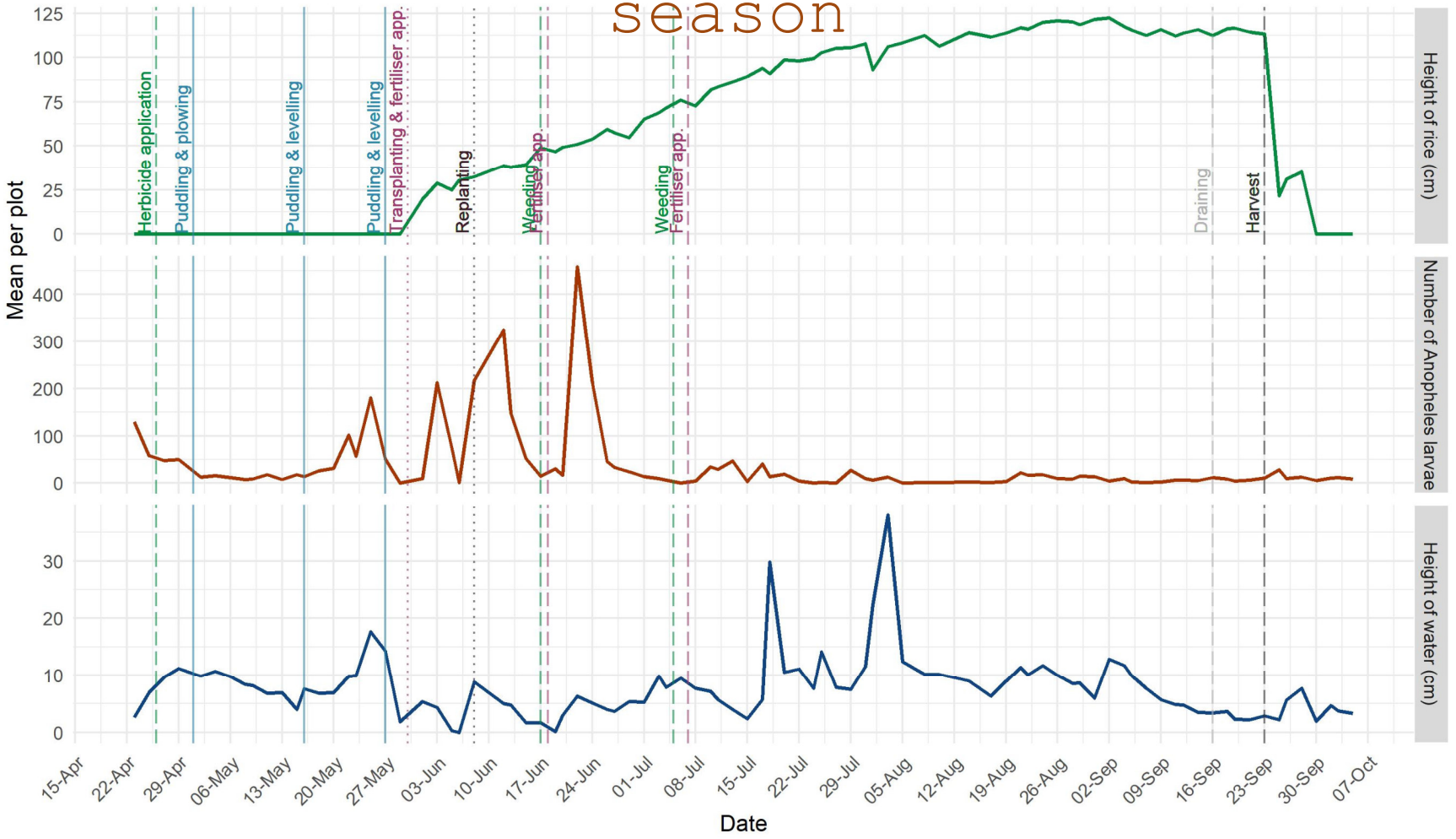
V notch for water use estimation



Chambers for greenhouse gas sampling

Mosquito larvae sampling:
1 hectare of rice can make **>5,000,000 *Anopheles* females** per cropping season

Riceland vector abundance during a season



Thank you

AfricaRice

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