

**Possibility of abiotic factors on the gradual yield decline
under continuous aerobic rice cropping system**

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By 2025, 15 out of 75 million hectare of Asia's flood-irrigated rice crop will experience water shortage. One of the new developments in water-saving technologies is to grow 'aerobic rice', which refers to high yielding rice grown in non-flooded and non-puddled lowland soil with supplemental irrigation. The growth and yield under continuous aerobic rice cropping showed gradual decline compared with flooded rice at the long term field experiment in the International Rice Research Institute (IRRI). This attributed to the build-up of soil pathogens such as nematode and fungus. A pot experiment was conducted to investigate biotic and abiotic factors on growth and yield decline using soil sterilization treatment

[Materials and Methods] Soil: Collected from the plots of cropping aerobic rice for 9 seasons (A-soil) and those of cropping flooded rice for 2 seasons (F-soil) at the experimental field in IRRI. Soil sterilization: Oven heating (95-98°C of soil temperature for 24 hours), Pesticide application with 1 Kg ha⁻¹ carbofuran of furadan and 0.3 kg ha⁻¹ of benomyl of Benlate at 1 week after transplanting, and Control (no sterilization). Rice cultivar: NSIC Rc9 (Apo). Cultivation: following the transplanted aerobic rice cropping system in IRRI.

[Results] 1) Nematode was not found at 10 days after pesticide application, while 0 to 424 nematodes per g of root fresh weight were found at panicle initiation stage (PI). 2) There were fewer tillers and shorter plant in A-soil than in F-soil in all treatments. 3) In A-soil, dry weight of aboveground biomass at PI in oven heating treatment was higher than the others, and that in pesticide application treatment was same as control. 4) These results suggest that reduction in growth occur even in the absence of pathogens. Gradual yield decline on continuous aerobic rice cropping may be solely attributed to abiotic factors.