Impact of ambient air pollution on locally grown gice cultivars (Oryza sativa L.) in Malaysia

ABSTRACT

This study presents the first experimental evidence of the sensitivity of rice plants to ambient air pollution from the Southeast Asian tropical region. Two widely adopted local cultivars of rice (Oryza sativa L.), MR84 and MR185, were grown in open top chambers ventilated with charcoal-filtered air and non filtered air, and in adjacent open plots on the campus of University Putra Malaysia. This is located on the south side of the Klang Valley, a rapidly developing area embracing Kuala Lumpur and other satellite cities, but where agriculture remains important The experimental period was from October 2000 to January 2001, corresponding to the main rice growing season in peninsular Malaysia. Adverse impacts on rice growth and yield were observed and were attributed to phytotoxic levels of ambient ozone. There was a clear difference in the sensitivity of the two selected cultivars. A yield reduction of 6.3% was observed for cultivar MR185 ($p < 0.01$) which was largely due to an increase in grain sterility, whilst the yield reduction for cultivar MR84 was not statistically significant. The reasons for these differing responses are discussed, and a comparison of the present findings with crop responses to ozone found under European conditions suggests a higher sensitivity in our study crops. With increasing industrialisation and urbanisation, this study highlights the need for further examination of the sensitivity of a wider range of crops and cultivars to ambient air pollution in this region, and also points to the potential for appropriate cultivar selection to ameliorate impacts.

Keyword: ambient air pollution; Klang Valley; Malaysia; open-top chamber; Oryza sativa L.; ozone; South Asian countries