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ONLINE ISSN : 1349-1008

PRINT ISSN : 1343-943X

Plant Production Science

Vol. 6 (2003) , No. 2 126-131

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Response of Sesame (*Sesamum indicum* L.) to Low Oxygen Concentration during Germination

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(Received: October 18, 2002)

Abstract: Screening of crop varieties tolerant to a low oxygen environment caused by heavy rain has become an important work in monsoon Asia countries in recent years. We examined the growth of sesame (*Sesamum indicum* L.) germinated for 5 d in air with 0.05 O₂ m³ m⁻³ (low oxygen concentration, LO), in comparison with those germinated in air containing 0.20 O₂ m³ m⁻³ (ambient oxygen concentration, AO). The growth of sesame was not suppressed but rather accelerated by LO. Immediately after the exposure to LO, seedlings had a 2 fold larger number of secondary roots, and more than 13.0% and 7.4% heavier in leaves and roots, respectively, over those under AO. After the oxygen treatments were over, the seedlings were immediately transferred to normal conditions to grow. One month later, the seedlings exposed to LO accelerated about two-fold dry matter (DM) over those under AO. In spite of lower content of chlorophyll, the leaf area ratio (LAR) and the net assimilation rate (NAR) of the plants exposed to LO were higher than those under AO. Compared to plants under AO, the ultimate leaf size of the cotyledon, the 1st leaf and the 2nd leaf of plants exposed to LO were 20.0, 22.9, and 27.0% greater, respectively. In comparison with pea (*Pisum sativum* L.), sesame respired in a different way. The total biomass yield and grain yield of plants exposed to LO were higher by 8.3% and 11.6% respectively than those under AO. These observations revealed that the hypoxic stress induced some different metabolic processes in the earlier growth stage of the plant and obviously had an advantageous effect on the subsequent growth of the plant.

Keywords: [Germination](#), [Hypoxic stress](#), [Sesame](#), [Sesamum indicum L.](#)

To cite this article:

Xiaohai Tian and Joji Arihara: "Response of Sesame (*Sesamum indicum* L.) to Low Oxygen Concentration during Germination". *Plant Production Science*, Vol. **6**, pp.126-131 (2003) .

doi:10.1626/pps.6.126

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