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## **Factors of relevance for improving the uniformity of oxygen distribution in drip irrigation water**

Hongjun Lei<sup>1</sup>, Huan Liu<sup>1</sup>, Ron Balsys<sup>2</sup>, David J. Midmore<sup>3</sup>, Min Zang<sup>1</sup>, Surya Bhattarai<sup>3</sup>

<sup>1</sup>School of Water Conservancy, North China University of Water Resources and Electric Power, Zhengzhou, Henan, China

<sup>2</sup>School of Engineering and Technology, Central Queensland University, Rockhampton, Queensland, Australis

<sup>3</sup>Institute of Future Farming Systems, School of Medical and Applied Science, Central Queensland University, Rockhampton, Queensland, Australia

### **Abstract:**

Aerating water using microbubbles in irrigation drip and subsurface drip irrigation systems has been reported to produce positive effects on plant growth and yield. However, maintaining the uniformity of bubble distribution in irrigation lines across long-row configuration is a challenge.

Air injection of microbubbles in irrigation water using a gas diffuser (Seair Diffusion System, Model SA75) has a significant gain in dissolved oxygen (DO) distribution over 850 m length of drip tape. Furthermore, with oxygen injection with a Venturi, DO in irrigation water reached as high as 44 ppm and was maintained well above 35 ppm up to a distance of 700 m and did not drop below 20 ppm, even at a distance of 850 m. Pressure compensated emitters recorded significantly higher DO concentrations compared to non-pressure compensated emitters along the entire length of the irrigation line. Additionally, use of surfactant in irrigation water, up to 4 ppm, resulted in increased gas void fraction and DO concentration compared to the control for both air and oxygen injection irrigation. Highest oxygen saturation was recorded with 4 ppm surfactant, both for air injections (165 %) and oxygen injection (438 %) treatment along 200 m of non-pressure compensated drip tape.

Keywords: aerated irrigation, dissolved oxygen saturation, gas void fraction, microbubbles, uniformity, plant growth