

May 2023

Special Seminar Effects of Elevated CO₂ Concentrations of Yields of Agricultural Crops Dr. Bruce Kimball, USDA-ARS (Ret.)



Friday, May 12, 2023 8:00 am UCCE – Kern County Office 1031 S. Mt. Vernon Ave.



"That elevated concentrations of CO_2 can increase plant growth has been known since at least 1804, when a scientist named De Saussure reported that peas exposed to high CO_2 concentrations grew better than control plants in ambient air (about 300 ppm at that time). Since then, thousands of experiments with elevated concentrations have been conducted, mostly in greenhouses and other types of enclosures, and almost all of them similarly showed increases in growth and/or yield. We also did a long-term (17 years) experiment on orange trees in open-top chambers and yields increased by about 70%. However, we wondered if the chamber experiments really represented open fields, so, therefore, about 30 years ago, free-air CO_2 enrichment (FACE) technology was developed that enabled the air above open-field plots to be enriched with CO_2 for entire growing seasons. Since then, FACE experiments have been conducted around the world on cotton, wheat, ryegrass, clover, potato, grape, rice, barley, sugar beet, soybean, cassava, rape, mustard, coffee (C_3 crops), and sorghum and maize (C_4 crops). Elevated CO_2 (550 ppm from an ambient concentration of about 353 ppm in 1990) decreased evapotranspiration about 10% on average and increased canopy temperatures about $0.7^{\circ}C$." Bruce Kimball

Demonstration of commercial application following presentation.

Brian Marsh, County Director & Agronomy Advisor 661-868-6210 or <u>bhmarsh@ucanr.edu</u>

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