

INTEGRATING STAKEHOLDER RELEVANT ECONOMIC, RISK, AND HEALTH FACTORS IMPROVES WATER SUSTAINABILITY

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We describe an innovative production system that is being adopted on farms across North America to reduce water and environmental footprints and production costs and risks. Most fresh produce is grown using raised bed plasticulture (RBP) on short and wide conventional beds (15-20 cm tall, 76-91 cm to wide), causing a perception that use of long irrigation cycles is necessary for proper wetted coverage. The RBP was redesigned to improve wetted coverage by using taller and narrower compact beds (CB; 23-30 cm tall and 66-41 cm wide). Large scale adoption of CB was possible by showing that factors beyond water, that are relevant to stakeholders, can be important drivers in achieving change. These factors included inputs, costs, production risks (pests/diseases, wind/flooding damages), labor health and productivity, and climate change adaptation.

Evaluation of CB began in 2013 and is continuing with co-investment from the industry and agencies on tomato, pepper, eggplant, and watermelon. Results show that CB maintained/increased yields and reduced: 1) production costs by up to \$600/ha; 2) water usage by up to 50%; 3) runoff by up to 50%; 4) plastics by up to 25%; 5) pesticide by up to 50%; 6) carbon footprint by up to 10%; 7) nutrient leaching losses by up to 10%; 8) root-knot nematode (*Meloidogyne* spp.) count; and 9) incidences of diseases (Fusarium wilt, Phytophthora blight). Preliminary evidence suggest that CB can improve worker productivity and reduce musculoskeletal stress. CB also showed no physical damage from hurricane Irma compared to complete damage for conventional beds. As growers are adopting CB, they have begun to change fertilizer management. Lessons learnt so far indicate that pursuing a win-win solution to increase both profits and environmental sustainability can achieve large scale changes which otherwise would not have been possible by focusing on water conservation and quality alone.

PRESENTER BIO: Sanjay Shukla is a Professor of Water Resources in the Agricultural and Biological Engineering Department at UF. He specializes in hydrology and water quality with focus on developing sustainable solutions. Recent recognitions include UF Foundation Professorship, Water Institute Distinguished Fellow, and 2020 ASABE Netafim and Virginia Tech Distinguished Alumni Awards.