

**Lecture by:**  
**Prof. Richard Bell**  
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**Topic:**  
“**Conservation agriculture and mechanisation  
for smallholder agriculture: a win-win for  
agriculture and the environment**”

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**Auditorium, Water Technology Centre**

**Organized by:**

**Professor Jayashankar Telangana  
State Agricultural University**

**and**

**Hyderabad Chapter – Indian  
Society of Soil Science**



# **Dr. Richard Bell, Ph.D. (Uni. Qld.)**

## **Professor**



He is a specialist in Soil Fertility and Land Management with lecturing and research experience in Australia, Bangladesh, Brazil, Cambodia, China, Indonesia, Fiji, Sri Lanka, Thailand and Vietnam. His interests are in plant nutrition on problem soils, soil management, management of sandy soils, diagnosis and correction of mineral disorders of plants, plant adaptation to mineral stress, nutrient cycling, rehabilitation of degraded land, conservation agriculture, dry land salinity, catchment hydrology and management, sustainable land use, and Third world agricultural development.

He authored 9 book chapters, 133 refereed journal papers, 50 refereed articles in books and proceedings, 239 conference and other non-refereed papers, 72 reports, and edited nine books. Much of his published work has concerned the mineral nutrition of crop and plants and rehabilitation of degraded land. His first international project experience was as Coordinator for a collaborative study with Thailand (1984-89) on the nutrition of food legumes in problem soils. Since then he has been the Project Leader of international cooperative research projects with China on boron and zinc nutrition of oilseed crops (1992-97), land suitability for upland crops in Cambodia (2004-2007); increasing rabi season legume crops production in north-west Bangladesh (2006-2009); reducing water pollution from aquaculture fishponds in Vietnam (2007-2009), developing soil and crop management for sandy soils of coastal south central Vietnam (2009-2012), developing conservation agriculture for smallholder farms in Bangladesh (2012-2017) and soil, nutrient and water management on sands in south-central coastal Vietnam (2014-2018).

## **ABSTRACT**

### **Conservation agriculture and mechanisation for smallholder agriculture: a win-win for agriculture and the environment**

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Conservation agriculture (CA) is now practiced on over 157 million hectares worldwide but adoption is still limited in smallholder farms of Asia and Africa. The practice of CA involves crop production with minimum soil disturbance, soil cover with crop residue or mulch and diverse rotations of crops. Research in Bangladesh demonstrates the benefits of CA for smallholders: yields are maintained or increased, savings of fuel, savings of labour, and more timely sowing of crops. In addition, the benefits for the environment include: decreased greenhouse gas (GHG) emissions, increased soil organic carbon (SOC), and decreased erosion. Development of CA in rice-based cropping systems is under way in Bangladesh and the Eastern Gangetic plain. Here, shortages of labour and intensive crop production (cropping intensity in Bangladesh is 190%) are driving interest among farmers in small-scale mechanisation based around the Chinese-made two-wheel tractor (2WT; 12-15 horsepower). The machinery is normally purchased and operated by small agricultural contractors known as local service providers (LSP) who hire their planting services to farmers. A number of planters, attached to the 2WT, have been developed for sowing seeds with minimum soil disturbance. At this stage strip planting (rotating blades till a strip 5-8 cm wide for planting seeds and placing fertiliser but < 25 % of the soil is disturbed) is favoured over tine or disk openers. Agronomic practices for mechanised seeding are under development including systems for effective weed control. Further challenges are to develop a supply chain for planters and planting services. Commercialisation plans for scaling out the use of planters for CA involve initial demand creation among farmers and then support to LSP and manufacturers to develop profitable business models. High level dialogue is required to create an enabling policy environment in which the private sector can promote CA and small-scale mechanisation so that benefit to farmers and the environment can be realised.

**Keywords:** *commercialization, fuel saving, innovation, labour saving, planters, policy, soil organic carbon, strip planting, unpuddled transplanting, weed control*