

## Keynote Speech

### Managing Soils for Advancing Food Security and Adapting to Changing Climate

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The number of food-insecure people in the world was 854 million in 2006, 923 million in 2007, 963 in 2008 and is 1020 million in 2009. The U.N. Millennium Development Goals, of cutting hunger by half by 2015, will not be met. On the contrary, food-insecurity is likely to be exacerbated by the projected climate change leading to increase in frequency of the extreme events (e.g., drought) and vulnerability of soils to degradation by depletion of soil organic matter, accelerated erosion, salinization, and other processes. The principal driver of food insecurity is the projected increase in the world population, from 9.7 billion in 2009 to 9.2 billion in 2050, by and additional 3.5 billion people almost entirely in developing countries where natural resources are already under great stress. The progressive decrease in per capita arable land area and the renewable fresh water supply is also confounded by competition for these scarce resources for use by industry, urbanization, and biofuel production. The strategy is to enhance soil and ecosystem resilience through recarbonation of the biosphere by improving quality of soils through C sequestration. Sustainable management of soils is integral to any strategy of mitigating and adapting to global warming and to improving the environment. Increasing soil and terrestrial C pools is also essential to advancing food security, especially when soils are degraded. The strategy is to enhance soil/ecosystem/social resilience. Resilience is not just bouncing back, but also permanently retaining the ability of soils and ecosystems to bounce back. Resilience approaches in soils include no-till farming with crop residue mulch and cover cropping along with complex crop rotations, creating positive C and nutrient budgets through integrated nutrient management, conserving water in the root zone and harvesting and recycling surplus water, and improving soil structure through biotic activity of micro-organisms and earthworms. It is important not to take soils for granted. If soils are not restored crops will fail even if rains do not; hunger will perpetuate even with emphasis on biotechnology and genetically modified crops; civil strife and political instability will plague the developing world even with sermons on human rights and democratic ideals; and humanity will suffer even with great scientific strides. Political stability and global peace are threatened because of soil degradation, food insecurity, and desperateness. The time to act is now.



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#### Academic Degrees

1968 Ph.D., The Ohio State University, U.S.A.  
1965 MSc, Indian Agic. Res. Institute, India  
1963 BSc, Punjab Agricultural University, India

#### Field of Study

Soil Science