Climate-smart maize

The FAO has defined climate-smart agriculture as agriculture that 'sustainably increases productivity, enhances resilience (adaptation), reduces/removes greenhouse gases (mitigation) and enhances achievement of national food security and development goals'. This complex definition can be simplified into three themes or goals:

- **Adaptation** of agriculture to the challenges posed by climate change
- **Mitigation** of the environmental impact of agriculture to reduce further climate change
- **Enhanced security** both of the food supply for a growing population and of the livelihoods of the millions of smallholders producing most of the world's crops and livestock

To achieve these goals, the cultivation of staple crops such as maize needs to achieve 'more with less' i.e. to increase output but with fewer inputs if it is to be truly sustainable. The answer to what seems a paradox lies in agriculture becoming smarter. Research is focussing on the various ways of achieving this.

Climate-smart research topics under the heading of '**Adaptation**' include:

- Improving climate risk prediction in maize cultivation
- Advances in our understanding of plant physiology e.g. the ways plants respond and adapt to environmental stresses
- Protecting the genetic diversity of maize, for example by conserving and exploiting wild species which may be better suited to harsher environments
- Developing new varieties of maize able to respond to the effects of climate change e.g. heat and drought-tolerant maize varieties

Topics under the '**Mitigation**' heading include:

- Developing higher-yield maize varieties or, for example, varieties with improved nitrogen uptake
- Defining and implementing good agricultural practice in sustainable maize cultivation
- Precision farming techniques to make more efficient use of inputs such as water or fertiliser (e.g. site-specific nutrient management)
- Ways of maintaining soil health for more sustainable, low-input cultivation (e.g. zero-till cultivation, mulching, crop rotations, intercropping such as maize-legume systems)
- Advances in drying and storage of harvested maize to reduce post-harvest losses (e.g. low-cost pest-proof hermetic storage grain silos)

Topics under the heading of '**Enhanced security**' include:

- Bio-fortification to improve the nutritional value of maize
- Improving the protein, starch and oil content of maize to add value to the crop
- Understanding and overcoming market and other constraints in the take-up of new techniques in maize cultivation in developing countries
- Ways of supporting smallholders in maize cultivation such as access to new varieties
- Regional strategies for supporting smallholder cultivation in in Africa, Asia and South America

Topics which cut across more than one category include:

- Breeding: both 'conventional' techniques, such as cross-breeding hybrid varieties and doubled haploid (DH) breeding technology, or the use of new genetic techniques, such as marker-assisted breeding and genome wide selection (GWS)
- Pests and diseases, ranging from advances in pest and disease-resistant maize varieties to integrated pest management (IPM) and biological control strategies for the control of maize pests such as push-pull technology

Burleigh Dodds Science Publishing is supporting this research in a number of ways. These include an innovative new subject page for maize (click here), with a range of useful information for researchers, and a major two-volume review of key research trends in maize (edited by **Dr David Watson - CGIAR Maize Research Program Manager**):

- **Achieving sustainable cultivation of maize Volume 1: From improved varieties to local applications**
- **Achieving sustainable cultivation of maize Volume 2: Cultivation techniques, pest and disease control**

See (here) for further details of what promises to be a standard work in its field. Together we hope to achieve the goal of truly climate-smart maize cultivation.