

## Towards an action plan for promoting the use of legumes in agriculture



Participants in the Legumes Workshop held at Alnarp on 17 July 2012. From left to right: Kerstin Huss-Danell, Tora Råberg, Christine Watson, Anne-Maj Gustavsson, Ulf Axelson, Janet Sprent, Mark Peoples, Anders Jonsson, Ann-Charlotte Wallenhammar, Md Rafique Ahasan Chawdery, Maria Ernfors, Marion Gérarddeaux, Nawa Raj Dhamala, Rodomiro Octavio Ortiz Rios, Justine Gauthier, Per Wessman, Georg Carlsson. Photo: Erik Steen Jensen.

**Despite increasing awareness of the need to move away from monoculture cropping systems that depend of inorganic N fertilizers, not enough attention has been given to the crucial role that increased use of legumes will play for agriculture's sustainability. Researchers, farmers and other stakeholders therefore need to engage in information transfer and knowledge sharing, at both national and international levels, to promote the use of legume crops in food production and to stimulate research aiming to overcome current limitations of legume-based production systems.**

On 17 July 2012, an international group of 18 scientists and students with a common interest in research about the roles of legumes for sustainable agriculture met in a workshop at the Swedish University of Agricultural Sciences (SLU) on the campus at Alnarp. The participants presented and discussed topics ranging from forage and grain yield stability and pathogen pressure in legumes, crop diversification by using rotations or cultivar and species mixtures, nitrogen fixation, nitrogen dynamics and losses, legumes contribution to adaptability and mitigation of climate change, rhizobia inoculation strategies, to nutritional and health quality aspects. Key lectures were given by Dr. Mark Peoples (CSIRO Plant Industry, Canberra, Australia, who has been recently appointed Honorary Doctor at SLU), Emeritus Professor Janet Sprent (University of Dundee, Scotland, who was appointed Honorary Doctor at SLU in 2010), and Dr Christine Watson (Scottish Agricultural College, Aberdeen, Scotland, and visiting scientist at SLU during May-July 2012).

The great potential of legume species for reducing the environmental impact of agriculture and providing high-quality food and feed sources was highlighted from various points of view, but concerns about current limitations to growing and using legumes were also emphasized in the discussion. Uncertainty about farmers' profits from legume production and small commercial interest for grain or vegetable legume crops among plant breeders were identified as two important

obstacles against increased legume cultivation and use. The need for inventory data and transfer of information about legumes' need for inoculation with rhizobia, depending on legume species, growth conditions and cropping history, was also raised as a major concern.

Efforts to overcome these obstacles include knowledge sharing among farmers, the scientific community, advisors, industry and decision-makers. This endeavour should be based on both scientific and practical experience. A key issue is research and information aiming to demonstrate possibilities for profitable legume-based production systems. Another important aspect is to highlight the gains for human health that can be obtained by using more legumes as food and feed sources, which could contribute to increased economical competitiveness of forage legumes for meat and milk production and grain or vegetable legumes for direct human consumption.

Legume breeding strategies should to a higher degree target traits that are important in a cropping systems perspective, such as the ability to produce under suboptimal environmental and low soil fertility. The fascinating diversity of legumes thriving in contrasting environments around the world can be explored to a much larger degree than today, in the search for traits such as adaptation to, for example, drought and phosphorous deficiency. Interesting data on surprisingly large genotypic and management effects on nitrogen losses during and after legume crops were presented and discussed, and highlighted the need for more research on N-use efficiency: from mechanistic understanding at the rhizosphere and plant genotype levels to management at the cropping systems level.

Quality control of rhizobia inoculants and critical assessments of the need to inoculate should be installed at national levels, so that any introduction of new soil microorganisms will be based on knowledge about their positive effects on legume production as well as possible negative effects on native soil ecosystems. Valuable inspiration can be achieved from Australia, where scientists and industry have a strong tradition of collaboration in developing agronomical strategies for rhizobia inoculation technology.

One direct output from the workshop is the planning of a symposium involving scientists, stakeholders and media, aiming to promote the use of legumes in agriculture.

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