Applying 4R Nutrient Stewardship to Wheat

By Terry L. Roberts and Rob Norton

Wheat is the most important grain of trade for human consumption. It is produced in a vast range of environments from central Russia to the great Indian and Chinese river valleys and across the Great Plains and Pampas of the Americas. Soils and climates vary and so do yield potentials, so that developing appropriate local nutrient management strategies is critical to ensure that yields are produced that give the most efficient use of fertilizers.

The principles of 4R Nutrient Stewardship—apply the right source of plant nutrient, at the right rate, at the right time, and in the right place—aim to use sound science to develop best management practices, producing good yields, providing good human nutrition, and keeping nutrients where they belong. The 4Rs underpin social, economic and environmental goals.

This special edition of *Better Crops with Plant Food* is focused on wheat and provides some examples of the science underpinning the 4Rs. This edition draws on examples of current best practice for nutrient management developed through IPNI's Nutrient Management Decision Support for Wheat Systems workgroup. It has examples from the major wheat production zones showing how the application of good science can improve yield and quality.

An important outcome from the work of the wheat group has been the development and refinement of *Nutrient Expert*, a decision support tool that provides growers with fertilizer recommendations based on nutrient removal. This has been extensively tested and reviewed in China and India and gives growers economic benefits compared to current nutrient management practices.

It is clear that cultivar selection has a big impact on fertilizer decisions—this is shown by the work from Russia with winter wheat as well as grain nutrient surveys. Matching

the 4Rs to a variety may need to be considered given these differences – and this suggests that we will need a variety of specific agronomic packages which include nutrient management. Much of the current improvement in efficiency (such as reported in the Russian work) is due mainly to rising yield potentials, but the paper by Hawkesford shows that within the current germplasm there is a range of nutrient efficiencies—associated with different traits—that could become important in developing future nutrient efficient cultivars. This becomes even more important when we consider the article by Lam et al. that N demand will increase as atmospheric CO_2 levels rise, and this demand will not necessarily be met by increased efficiency of N acquisition by wheat, nor by increased N fixation by legumes. Strategic interventions will continue to be needed to improve yields and nutrient use efficiency. BC

Dr. Roberts (troberts@ipni.net) is President of IPNI. Dr. Norton (rnorton@ipni.net) is Director, IPNI Australia and New Zealand Program.

Common abbreviations and notes: N = nitrogen; CO_2 = carbon dioxide.

Nutrient Deficiency Photo Application for iPhone/iPad Released

IPNI has released a new Crop Nutrient Deficiency Photo Library app for your iPhone or iPad (see http://info.ipni.net/ndapp). The app contains key photos of classic nutrient deficiency documented from research plots and farm fields for 14 common crops. It also provides supporting text and illustrations of nutrient deficiencies. This mobile app will be a great tool for crop advisers, consultants, farmers, and anyone wanting help in identifying nutrient deficiency symptoms in common crops. BC