

A MANUAL FOR 4R PLANT NUTRITION

The International Plant Nutrition Institute will release a 4R Plant Nutrition Manual in early March. Based on the conceptual framework developed with industry, government and academic partners, this manual supports a new vision for plant nutrient use in sustainable agriculture. Each of its 9 chapters relates scientific principles of 4R Nutrient Stewardship to the management of plant nutrition.

1. Goals. Society has high expectations for progress on sustainability issues associated with producing sufficient, safe, nutritious food. Nutrient applications increase crop yields, nourishing the world while sparing land for other uses, but poorly managed applications may increase nutrient losses, potentially degrading water and air quality. These issues drive increased attention to setting strong sustainability goals.

2. 4R Nutrient Stewardship. The concept is simple—apply the right source of nutrient, at the right rate, at the right time, and in the right place—but the implementation is knowledge-intensive and site-specific. Stakeholder input is essential for setting specific sustainability goals. The right practices to achieve them are best selected by the producer, with support from crop advisers and decision support tools based on sound agronomic science.

3. Right Source. There is no single right source of nutrient for all conditions, but the question of which source is right for any specific set of conditions should be continuously evaluated. This chapter provides information on the properties of the major nutrient forms supplying essential elements.

4. Right Rate. The central principle of setting the right rate is to meet the nutrient demand of the crop. This chapter provides information on crop nutrient uptake and removal, and the importance of assessing the supply of nutrients from the soil, from indigenous sources and from other materials applied to the land.

5. Right Time. Application timing that matches the timing of plant demand minimizes opportunities for losses driven by weather and soil processes. This chapter explains the dynamics of the N cycle and how nutrient uptake relates to plant growth stage.

6. Right Place. Right placement is all about positioning nutrients strategically, so plants that need them have access to them. This chapter explains the means by which plant roots take up nutrients from the soil, and how applied nutrients are retained or dispersed within the soil.

7. Adapting Practices. Best practices are dynamic and evolve as science and technology expands our understanding and opportunities, and practical experience teaches the astute observer what does or does not work under specific local conditions. A process of adaptive management is essential to determine the right practices for any enterprise involved in growing plants and producing crops.

8. Practices that Support all 4Rs. This chapter describes how to assess the soil's capacity to supply nutrients through scouting for visual symptoms, plant analysis, soil testing, and nutrient omission plots. It includes identifying the right approach to the interpretation of these sources of information.

9. Stewardship Planning and Accountability. Focusing on economic, environmental, and social priorities established by stakeholders distinguishes a 4R Nutrient Stewardship plan from other nutrient management plans. This chapter outlines steps to developing such plans, providing information on managing losses of N and P to minimize harm to the environment.

This manual is intended to help leaders—be they farmers, crop advisers, agri-retailers, extension workers, scientists, regulators or consumer advocates—to more fully acquire and disseminate this new vision for the management of plant nutrition. For details on obtaining your copy of the 4R Plant Nutrition Manual visit www.ipni.net.

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Abbreviations: N = nitrogen; P = phosphorus.