

## WHAT ARE THE 4Rs?

**4R nutrient stewardship** provides a framework to achieve cropping system goals — increased production, increased farmer profitability, enhanced environmental protection and improved sustainability. To achieve those goals, the 4R's incorporate the:

**RIGHT FERTILIZER SOURCE** *at the*  
**RIGHT RATE**, *at the*  
**RIGHT TIME** *and in the*  
**RIGHT PLACE.**

Properly managed fertilizers support cropping systems that provide economic, social and environmental benefits. On the other hand, poorly managed nutrient applications can decrease profitability and increase nutrient losses, potentially degrading water and air.

4R nutrient stewardship requires the implementation of best management practices (BMPs) that optimize the efficiency of fertilizer use. The goal of fertilizer BMPs is to match nutrient supply with crop requirements and to minimize nutrient losses. Selection of BMPs varies by location, and those chosen for a given farm are dependent on local soil and climatic conditions, crop, management conditions and other site specific factors.

Other agronomic and conservation practices, such as no-till farming and the use of cover crops, play a valuable role in supporting 4R nutrient stewardship. As a result, fertilizer BMPs are most effective when applied with other agronomic and conservation practices.

## HOW YOU CAN PUT 4R NUTRIENT STEWARDSHIP TO WORK FOR YOU!

To utilize the 4Rs to achieve your cropping system goals, apply the **Right Source** of fertilizers that are in — or are easily converted to — compounds best used by the target crop. Apply the **Right Rate** of fertilizer to match nutrient supply with crop requirements. Apply fertilizer at the **Right Time** so nutrients will be available when crop demand is high. Apply or maintain fertilizer in the **Right Place** where the crop can access the nutrients most effectively. Applying these general practices will minimize nutrient transport from fields and maximize crop uptake and utilization.

- **EDUCATE YOURSELF**
- **CONSIDER WAYS TO EXPAND YOUR 4R PRACTICES**
- **SPREAD THE WORD!**

This publication provides agricultural professionals with a guide for implementing 4R Nutrient Stewardship on the farm. To be effective each plan must be field and farm specific and BMPs must be identified in areas of source, rate, time and place to achieve the sustainability goals.



FERTILIZER CANADA

[4R.fertilizercanada.ca](http://4R.fertilizercanada.ca)



The Right Time  
for Nutrient Stewardship

# IS RIGHT NOW



# 4R NUTRIENT STEWARDSHIP IMPLEMENTATION GUIDE

# USE THE 4Rs RIGHT NOW.

## DEVELOPING A NUTRIENT MANAGEMENT PLAN USING THE 4Rs

### Step One

#### Identify Economic, Social and Environmental Goals Specific to Each Field and Operation

Goals will vary with field and farming operations depending upon the cropping system, grower approach and the risks identified. The following are some examples of goals commonly identified by growers.

##### Economic Goals

- Improve net farm income.
- Contribute to improved regional economic development.

##### Social Goals

- Improve the quality of farm family housing, diet, and education.
- Improve productivity of farm labor by appropriate use of emerging technologies that increase efficiencies of field operations and reduce costs per unit of crop harvested.
- Improve access to sources of information to assist in farm management decision making.

##### Environmental Goals

- Maintain or reduce unwanted losses of nutrients to the environment, examples:
  - reduce soil erosion of nutrient containing soil particles by wind or water
  - reduce volatile emissions of ammonia ( $\text{NH}_3$ )
  - reduce nitrification and denitrification losses of nitrous oxide ( $\text{N}_2\text{O}$ ), and di-nitrogen gas ( $\text{N}_2$ )
  - reduce leaching losses of nitrate ( $\text{NO}_3^-$ )
  - reduce losses of soluble phosphorus through surface or groundwater flows
- Reduce energy (i.e. fuel, and or electricity) use per harvested unit of farm production, examples:
  - implement reduced tillage or no-till practices
  - convert over to low pressure irrigation systems if irrigation is used
- Improve recycling of crop nutrients from crop residues and livestock manures.

#### 4R Online Training Course

Take an in-depth look at the principles, practices and planning required to develop and implement a 4R Nutrient Stewardship plan on-farm.

Certificate of completion and/or CCA CEUs available!

[elearning.fertilizercanada.ca](http://elearning.fertilizercanada.ca)

## ANSWERING THE CHALLENGE WITH 4R NUTRIENT STEWARDSHIP

### Step Two

#### Select BMPs that are Specific to the Soil, Climate, Cropping System and Goals Identified by the Grower

Best management practices are selected to assure the right source is applied at the right rate, time and place in terms of the farm goals identified in step one. These practices are specific to the soil, microclimate and crop rotation of the field and to the available equipment and technology of the farm.

### Step Three

#### Integrate BMPs for All Goals and Adjust as Needed

Some BMPs selected to achieve the initial sustainability goals may not integrate well. In these situations the grower will need to adjust their goals and priorities. For example, the cultivation and planting to crops of a riparian area along a stream may reduce economic return goals unless environmental incentives are provided for the implementation of the BMP.

### Step Four

#### Document 4R Nutrient Management Plan

The final BMPs to be implemented for each field/subfield can now be outlined for each nutrient.

