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THE PRECAUTIONARY PRINCIPLE FOR PHOSPHORUS FERTILIZERS

Many public risks have scientific uncertainties. Examples include pathogens in drinking water, and genetically modified organisms. Science hasn't yet answered all the questions—and maybe never will. So some argue that when new alternatives involve uncertainty, the precautionary approach is to avoid or limit their use as much as possible. Policymakers and regulatory authorities are applying this precautionary principle to more and more issues in natural resource management. What if we applied it to the use of phosphorus fertilizers?

Taking phosphorus from the ground and distributing it across the continent undoubtedly involves risks. Surface mining scars the earth's surface (though today most mines are restored to natural habitat or to productive farmland, even orange groves). Treating the ore with concentrated acids involves hazards that demand strict attention to safety. The ore contains trace elements in higher amounts than in most soils. Distribution and transportation entails risks of accidents. And after phosphorus fertilizers are applied, there is risk that the nutrient may move from the field to surface waters, stimulating algal blooms and creating taste and odor problems in drinking water from reservoirs. **So with all these risks, why hasn't someone stopped their use?**

The reason why is that these risks, as hinted above, are for the most part manageable. Science-based risk analysis ensures acceptability. And foregoing the benefits would entail an even larger set of risks.

It's not hard to make the case for the benefits of phosphorus fertilizers. Even aside from their essential role in producing food, they benefit the environment. They support the basic process of photosynthesis, the original source of the organic matter that improves the quality, structure, water holding capacity, and nutrient retention of the soil. More vigorous plant growth results in more ground cover, reducing erosion that contaminates water and air. Phosphorus fertilizers help produce food using less land, saving space for other forms of nature. And finally, they boost quality, especially for healthful fruits and vegetables.

Efforts to reduce risks in the agri-food system have produced a huge library of best management practices. They include management plans that limit the use of nutrients including phosphorus fertilizers. These plans need to identify both risks and benefits. Ideally they should provide a science-based analysis which weighs risks against benefits.

"Better safe than sorry" is a time-tested aphorism...but so is "nothing ventured, nothing gained." Both need to be applied to the risks that apply on either side of any given issue. When the issue is nutrient management, there is a need both to venture and to exercise precaution.

We need to venture toward a higher level of accountability and environmental protection, and at the same time toward innovative practices that optimize both crop yield and quality. The tools of precision agriculture—yield monitors, intensive soil sampling, remote-sensed soil and crop mapping—boost efforts on both ventures. They can help identify the appropriate source, rate, placement and timing of nutrients to benefit the crop and minimize detriment to water quality.

Applying the precautionary principle to nutrient management should mean more than setting limits on their use. Equal emphasis should be placed on avoiding the risk of limitations to crop yield and quality as on avoiding the risk of water contamination. In the end, those who venture to manage most intensively will be those who achieve the highest levels of precaution.

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Note: *Agri-Briefs* are available online at the PPI website: ppi-ppic.org/agri-briefs