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Chemistry of Soil–Nutrient Interactions and Future Agricultural Sustainability

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9–1 INTRODUCTION

This chapter involves the portion of soil chemistry that relates to the supply of nutrients from the soil to the plant root surface. This is a highly significant phase of soil chemistry since it is involved in the growth of all plant species growing in all soils throughout the world. While we are usually concerned with those species used directly or indirectly for food, this phase of soil chemistry also is concerned with all plant species that grow in soil, for example, the growth of trees for their many uses from newsprint and lumber to their use for scenic beauty and air purification. It also is important for golf courses, athletic fields, flowers, and the many other uses we make of plants. In addition to the chemistry of nutrient supply to the root it is involved with supply of toxic elements that may interfere with plant growth as well as be harmful to humans, animals and birds, and others, which eat plants or their parts. Hence, the chemistry of the soil–plant root interface is important for food, shelter, sports, health, and others, worldwide.

Involvement in soil chemistry during my career has primarily been with its influence on nutrient supply to the root surface. Hence, this paper in the symposium “Whither Soil Chemistry” will be based on impressions gained during my 45 yr research career. During this time I have been asked to give talks at International and National meetings that were primarily plant oriented as well as at meetings that were primarily soil oriented, since this area involves both plant chemistry, soil chemistry, and their interaction. Hence, I will briefly discuss some of the soil chemistry that has helped me understand plant nutrition problems, then I will give my opinions on soil chemistry research that may be promising areas for future research.

9–2 DEVELOPING A NUTRIENT UPTAKE MODEL

Developing a concept of soil nutrient supply to plant roots and publishing it was important in the development of my research, so I recommend it. It focused

1 Contribution from the Department of Agronomy, Purdue University, West Lafayette, IN.