

20. THE FUTURE OF SOIL AND PLANT NUTRITION

The future potential benefits from improved soil and plant nutrition are virtually limitless. This is in contrast to the benefits to be obtained by improving other aspects of crop production. For example, there is a finite limit to obtaining improved yields through improved plant spacing; improved yields through pest and disease control are limited by the fact that you can only kill a particular pest so dead.

New higher yielding varieties and improved farm management will continually exert pressure on improvement of plant nutrition. Higher per acre yields from improved varieties and improved farm management are a given. Higher yields, by definition, mean higher nutrient use and demand by crops. Couple this with the wider use of purer, "nutrient free" water for irrigation and with longer and longer individual field histories of nutrient removal and it becomes clear that soil and plant nutrition will be an exciting and active field of endeavor for many years to come.

Two major areas for improvement in soil and plant nutrition are old ones:

1. Improved soil and plant analysis techniques faster and more accurate methods.

2. Improved interpretation of soil and plant analysis data -

e.g., the DRIS method of interpreting plant analysis data.

These two areas always have been and always will be areas for improvement.

Many problems in plant nutrition lay in between the disciplines of plant science (or horticulture) and soil science the calcium stress problem is an excellent example. A cooperative, interdisciplinary approach to solving such problems is the best approach.

The fieldman should never accept current concepts in soil and plant nutrition without some reservations. All concepts are subject to change and improvement. Two tenets that were among those most drilled into me during my college training were:

1. Soil tests for nitrogen, including nitrate, are a poor way to evaluate the nitrogen needs of row crops because of the transient nature of soil N.

2. Deciduous orchards (and vineyards) should be fertilized in the winter so that nutrients are in place when the tree makes it's growth surge in the spring.

The reasoning behind these tenets was logical and well presented, however both tenets have fallen. Soil nitrate tests can provide good information for row crops. It has

been found that a deciduous tree's growth surge in the spring comes mainly from nitrogen materials stored during the late summer and fall and that late summer or fall fertilization is superior to winter fertilization.

We have a tendency to accept things as being true if they are printed in black and white, more so, if the printing and paper quality are good, more so yet if they are found in an authoritative publication, even more so if they come from an authoritative source. **Nothing** should be accepted without question.

It is inevitable that some of the presently accepted tenets in soil and plant nutrition will fall by the wayside in the future to be replaced by sounder tenets which in turn will be subject to refinement and replacement. This process is a never ending one and should not be resisted it is called progress.

By definition, the resistance to a new idea can impede progress. There is undue pressure, especially in the U.S. on being correct or on not being wrong people are too often judged by their mistakes rather than by their accomplishments. The result is the inhibition of new, potentially worthwhile ideas. This is especially true in academic agriculture where the penalties for being wrong are excessive. It is a virtual impossibility to be correct 100% of the time being correct 60% of the time on 1000 efforts can be superior to being correct 100% of the time on 1 effort, (if one is thoroughly conscious of the fact that no idea is infallible); productivity is more important than batting average.

Often the discussion of an incorrect idea can be more meaningful and can bring us a bit closer to the truth than the enlightenment engendered by a correct idea. Albert Einstein was well aware of this. Einstein was always interested in honing, discarding, reworking and changing his theories, forever searching for a more refined, a purer truth. He was more interested in getting at the truth than in whether his own particular ideas were correct. He was willing, even anxious, in inviting criticism of his ideas and had no qualms about abandoning an idea if it's lack of merit could be demonstrated; he was, in fact, delighted when someone could point out a mistake or improve on one of his ideas. Einstein was, and is, revered by those in his fraternity as much for this latter quality as for his scientific accomplishments. The combination of both is a powerful one a case where the whole is greater than the sum of the parts.

Too often we are concerned solely with being right. The merits of positive, meaningful, correct results cannot be denied, but with the pressure for results, a part of the imagination and capability of man is sacrificed. Academic (and some other) institutions can discourage rather than encourage original thinking. In a thoughtful piece, one agricultural scientist offered these views:

"It is a foolish young scientist who does not soon learn that the Court of the

Inquisition still sits in judgment on the unorthodox. In 1616, it forced Galileo to submit to the orthodoxy of the theologians. Today's equivalent comes from a web of bureaucratic rules and policies. All are well intentioned, but their cumulative effect is to exert a powerful pressure towards orthodoxy. Our bright young people need to be allowed a little more freedom and a chance to prove themselves original thinkers without the system whipping them into traditional, sometimes unimaginative channels."

The future of soil and plant nutrition depends a great deal on the quality of people that enter into the field. In the U.S., there is currently more than the usual emphasis on making as much money as possible in life. As a result, some of the better young minds in the country are attracted to fields where they feel the money is. For some such minds, this might mean a career as a lawyer rather than a career in agriculture. A recent rebuttal to this approach makes a good point:

"The real trouble with the American legal system is the amount of society's resources it diverts from truly creative and productive activity. We see this on the level of the individual lawsuit, and we see it in whole industries paralyzed by overly complex and often illogical restraints. It is hardest to see, but most damaging, on the level of the individual lawyer. As Carter pointed out, the U.S. has three times as many lawyers per capita as England and 21 times as many as Japan. Year by year our system of social rewards entices many of our brightest and most energetic young adults into this essentially fruitless activity as their life's work. How many scientific breakthroughs and great novels and management innovations have we lost by this absurd arrangement?"

The preceding is overstated as there are many in the legal profession engaged in useful, productive work; it does, however, make a point.

There are a significant number of excellent, brilliant minds in the field of soil and plant nutrition and in the field of agriculture as well, men and women that would have been highly successful and far better off financially in other lines of work. They are aware however, of the rewards to be found in useful work. To attract the best minds into soil and plant nutrition, the appeal must be made to the value of doing useful work rather than the monetary rewards.

For those that might doubt the meaningfulness, or, to use a word currently in favor, relevancy, of plant nutrition or agriculture as a career, consider these words from a leading agriculturist prior to the 1977 meeting of the American Society of Agronomy:

"Probably, no meeting in 1977 of politicians, bureaucrats, social reformers, urban renewers, modern-day Jacobins, or anarchists will cause as much change in the economic and social structure of the country as the ASA meeting of crop and soil scientists."

Overstated? Perhaps; then again, maybe not.

General Reference

Vallery-Radot, Rene. **Life of Pasteur**. Garden City Publishing Co., Inc., Garden City, N.Y. (N.D., circa 1923).