Applications and Problems of Radiation and Radioisotopes in Agriculture

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It has become the practice in this Society to set aside in the General Session time for a review of some facet of agronomy or of some broad topic of significance to agronomists. The topic assigned to me certainly falls in the latter category. Indeed some of the problems that will be discussed are of significance to all men, though agronomists may have some very special responsibilities in relation to them. This will not be a research report, but a statement of my personal point of view on some aspects of the opportunities and problems that confront us as agronomists in what has been called the atomic age.

General Considerations

We are to consider the contributions of radiation and radioisotopes to agriculture and also some of the problems which man’s handling of these has engendered. To do this adequately we have to think back over the road traversed in the past few years. We should cast our minds back to the period after World War II when it was realized that man would now have at his disposal quantities of radioactive elements far beyond anything previously available, and that these could constitute sources of heat for power, or of intense radiation capable of employment in hitherto unprecedented ways. This was a development born of war, nourished by the force of destruction and pushed ahead by a massive national effort. It was to herald a new age, an age in which everything would be different. Industry, transportation, medicine, and agriculture all would be changed to various degrees as a result of the new knowledge and new materials that had come to us. Perhaps it is about time, 14 years later, to ask ourselves to what extent, in the brave new world that was promised, agriculture has been changed. For the purpose of this occasion it is only the agronomic aspects of agriculture that will be considered.

What opportunities are there for atomic energy, radiation, and readily-available isotopes to aid agriculture? Is it likely that nuclear power can in any way alter production operations? Is nuclear-powered equipment just around the corner and, if so, would it do cheaper, the jobs that conventional equipment can do? Clearly the answer to both of these questions is no. Is it likely that nuclear power or some nuclear reaction could greatly reduce the cost of fixed nitrogen fertilizer would become very cheap and in endless supply? Can intense radiation somehow be used to eradicate weeds or insect pests? There has been no such developments. There has been no revolution, and perhaps one should never have been expected of the proponents notwithstanding.

However, the application of radiation and radioisotopes has accelerated the progress of agricultural research and may be expected to continue to do so. The atomic age on agriculture is likely, therefore, to be made manifest only by scrutinizing closely the content of research in agriculture. In the past two decades its vigor and coherence have been substantially enhanced, partly as a result of greater support, partly because of the acceptance of new values and goals, and partly because of the involvement of new techniques.

Radioisotopes in Agronomic Research

Now it is certainly true that there has been a quickening of much of biology which is basic to agriculture as a result of the availability of certain isotopes, particularly carbon 14, and that understanding of processes in plants and animals has been enhanced. In plant physiology a good deal of new knowledge has been acquired about the absorption, accumulation, and redistribution of inorganic ions present in the root environment, much of it made unambiguous by the use of isotopes and autoradiographic techniques. All of this is a matter of general knowledge.

One can therefore say that benefits to agriculture have resulted, but one cannot readily be specific.