PREFACE

Potassium is one of the "three big" major nutrient elements needed for growth and development of a plant. Manorial trials in India have been excluding this vital element from the fertilizer mixtures believing that soils can supply it adequately out of their natural resources to the growing crop. All Research Reports in India indicated that there was no response to yield of crop due to Potassium manuring. Hence there has been all along emphasis to add only nitrogen and phosphorus fertilizers to the soil.

Work done by Finland, Denmark, Sweden and Switzerland countries in using balanced fertilizer mixtures of nitrogen, phosphorus and potassium to get good high yield in crops, induced this investigation to study "potassium fixation" in Indian soils.

To comprehend the exact cause of "no" response to potassium manuring in Indian soils it was felt that perhaps fixation of potassium may be the main factor. Since average yield of all crops in India remained low even though soils were fertilized adequately with nitrogen and phosphorus manures, therefore, it was felt that perhaps potassium supplying power of the soils were low for a growing crop.

As potassium fixation and its release from the fixed state are reversible reactions going on in the soil, so it was felt to study the conversion of one type of clay mineral to another and utilize this phenomenon in the development of the study of clay mineralogy.

Chemical methods were selected for this work.

This thesis is divided into two main parts:
Part I.

Reactions relating to potassium fixation in soils, colloid silicates and clay materials.

To simplify interpretation and comprehension of the phenomenon of potassium fixation, this part was further subdivided:

(i) Factors influencing potassium fixation in silicates.
(ii) Properties of soil and colloids that are altered as a result of potassium fixation.
(iii) Structure of silicate which may be responsible to fixation.

Part II.

Liberation of fixed potassium:

(i) Physical and chemical factors which induce potassium release from the fixed state.
(ii) Properties of silicates that are changed as a result of release of potassium from the fixed state.
(iii) Chemical weathering of muscovite, biotite and illite.
(iv) Potassium supplying power of soil clay fractions.

During the course of this study it became imperative to investigate the working of the rapid and accurate reactions involved in the estimation of potassium. Hence study of various factors on which accuracy of potassium estimation depended was undertaken.

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New Delhi.

14th September, 1956