The Effect of Certain Mineral Elements on Peanut Fruit Filling

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The inconsistencies in results obtained from soil fertility investigations with peanuts are striking. Discrepancies are found not only in data from different states or regions, but also in the results from a given state. That such discrepancies exist is not so disturbing as is the fact that research workers have been at a loss to interpret them. One of the main factors restricting proper evaluation of results of peanut field experiments is a lack of fundamental information on the specific effect of the mineral elements.

The fact that peanut fruits develop underground complicates any study of the mineral element requirements of this plant. This necessitates taking into account the characteristics of the upper few inches of soil in which the fruits develop, as well as the usual consideration of a supply of nutrients available to the roots.

The present investigation is primarily concerned with the determination of the specific effect of supplying certain ions to the zone of fruit formation, although one experiment involves rooting zone treatments. Peanut fruit filling and mineral composition of the stems were used as criteria of plant response.

LITERATURE

At the time the present investigation was initiated little information was available on the nutrient requirements of developing peanut fruits. That a nutrient supply to the developing gynophores may be of importance, however, has been recognized since 1895. In that year Pettit (8) reported indirect evidence that gynophores may be able to absorb water and nutrients. This investigator cut the tap root of a vigorously growing plant so as "to separate the root system from the stems", leaving the latter connected with the soil by numerous gynophores. At the end of two weeks the plant as a whole was still alive and new leaves were forming on most of the branches.

Pettit also called attention to the presence of tiny hairs on the above-ground portion of young gynophores. These hairs gave an acid reaction to litmus paper. Waldron (12) confirmed the presence of hairs on the pegs and emphasized the possibility of absorption through them. Van der Volk (11) found that the gynophores would bear fruit in a soil extract, but not in rain water. Reed (9), however, wrote that, "it is very improbable that the peanut is affected to any great extent by the presence of hairs on the gynophores." The reasons given for this conclusion were (a) the relatively low moisture content of the upper portion of the soil and (b) the difficulty experienced in locating the hairs on field grown plants. Shibuya (10) found that the gynophores absorbed water, but that the use of Knops solution as a fruiting medium delayed the beginning of "fruitification."

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3The familiar peanut pod develops at the tip end of a stalk known as a gynophore, or "peg". Gynophores originate following fertilization at the leaf axils and enlargement of the tip takes place after the gynophore has penetrated an inch or more into the soil.

4Figures in parenthesis refer to "Literature Cited", p. 167.