INFLUENCE OF SOIL-AGGREGATING SUBSTANCES ON THE POPULATION OF GUM-PRODUCING BACTERIA IN A LOESS SOIL

by

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The development in the last year or so of poly-electrolytic resins for the purpose of producing greater or more useful amounts of soil aggregation has opened up new possibilities for nursery-men, vegetable growers, home gardeners and others who cultivate land quite intensively. This is particularly timely in view of the fact that the rapid mechanization of so many agricultural operations and commercial transport activities during the past two or three decades has been making it increasingly difficult and costly to obtain sufficient animal manures and litter for such lands to make their continued intensive cultivation possible.

Chemical fertility is a problem which is fairly well understood and can be dealt with quite effectively nowadays. Physical fertility of soil is another matter; adequate aeration, satisfactory absorption and passage of water and good water holding capacity can be obtained normally in soils as the result of a high degree of macro-aggregation or the frequent addition of more or less readily decomposable organic materials.

It appears now to be practicable to maintain the good aggregation of small areas of intensively cultivated land in the case of many soils, even at the present cost of these synthetic soil conditioners; but, the use in rotation of vigorous pastures containing a high proportion of perennial grass seems to be only available method for the maintenance of a reasonable degree and type of soil aggregation in large-scale culture.

The question has been raised frequently since the advent of these
products as to just what effect such substances are likely to have on the soil microflora. In general, it has been considered likely that by inducing greater aggregation they should make soil conditions more favourable for aerobic species. There is also the possibility that the substances themselves, chemicals introduced with them, or decomposition products could be toxic to certain soil microorganisms. Therefore investigations were undertaken in the first instance, during 1952 to check the effect of several of these substances on the gum-producing bacteria present in loam derived from loess, a very important type of soil in central Belgium.

Although one of the most productive soils of this country and of Europe, this loam is showing now some evidence of structural deterioration.

**METHODS.**

For this investigation soil from a highly productive cultivated field was used. This soil had been derived from a loess deposit, as described by MANIL (1952), cut number one, Briqueterie Laubain, Gembloux. Having been limed liberally over the years, it had a pH of 7.8. Twenty five large samples, each composed of a composite of about eight smaller lots, were taken to ploughing depth at random from a field which had just produced a heavy crop of wheat; these were mixed thoroughly, screened in a slightly moist state through a 3 mm mesh, mixed again and allowed to become air-dry during a period of hot summer weather. The mechanical composition of the actual mixture used was determined by the Pedology Department of this Institute and is shown in Table 1.

It was found by chemical analysis and also by the *Aspergillus*

| TABLE I. |
|---|---|---|---|---|---|
| **Fraction** | **Clay** | **Silt** | **Very fine sand** | **Fine sand** | **Gross sand** |
| **Size** | 0-2 μ | 2-10 μ | 10-20 μ | 20-50 μ | 50-100 μ | 100-2000 μ |
| **Percentage** | 13.95 | 11.89 | 20.15 | 47.44 | 3.60 | 2.96 |