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Variations in the Viscosity of Solution Cultures of Rhizobium

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VARIATIONS IN THE VISCOSITY OF SOLUTION CULTURES OF RHIZOBIUM

D. A. ANDERSON AND R. H. WALKER

In the course of a study of the gum produced by the root nodule bacteria of legumes a close correlation was found to exist between the gum content of solution cultures of some species of Rhizobium and their viscosities as measured by means of an Ostwald viscosimeter. Certain cultures produced relatively viscid solutions while others showed practically no increased viscosity.

As a result of these experiments a test involving a large number of cultures was therefore made to determine whether or not viscosity production is a species characteristic. Solution cultures of 61 of the laboratory stock cultures of Rhizobium were prepared. The comparative viscosity of the solutions was determined after 7 days incubation at 28°C.

The cultures of alfalfa bacteria, *Rhizobium meliloti*, the lupine bacteria, *Rhiz. lupini*, the soybean bacteria, *Rhiz. japonicum*, and the cowpea bacteria, produced very little increase in the viscosity of the culture solution. Forty-six cultures of these species showed an average increase of only 1.4 seconds in the time required for the solutions to flow through the Ostwald viscosimeter as compared with the sterile culture solution. These increases ranged from 0.1 to 3.9 seconds.

On the other hand, the cultures of red clover bacteria, *Rhiz. trifolii*, bean bacteria, *Rhiz. phaseoli*, the pea bacteria, *Rhiz. leguminosarum*, and the dalea bacteria, showed considerable increases in viscosity when compared with the control. The 15 cultures of these species showed an average increase in the time of flow of 20.2 seconds. The increases range from 1.5 to 54.2 seconds. Fourteen of the fifteen cultures showed increases of more than 5.0 seconds, and 12 showed increases of more than 10.0 seconds.

These results indicate that the ability to produce viscosity increases in solution cultures may be characteristic of certain species of Rhizobium and, hence, may be of value as a differential character.

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CROSS INOCULATION BETWEEN THE ROOT NODULE BACTERIA OF SOYBEANS AND COWPEAS

R. H. WALKER AND P. E. BROWN

It has been quite generally accepted for a long time that the root nodule bacteria from soybeans would not produce nodules on cowpeas, and that the bacteria from cowpea nodules would not produce nodules on soybeans. This conception has been supported by numerous cross-inoculation tests and field