

ABSTRACT

Characterization of a cowpea rhizobiophage isolated from Jamaican soil

Veronica Rosemarie J. Morgan

A cowpea rhizobiophage (JRW3 phage) from Jamaican soil was isolated and characterized. The morphology of the phage was elucidated by examining its ultra-structure. In an attempt to further characterize the phage, the adsorption rate, one step growth pattern, calcium ion requirement, host range and the effects of some physical factors on phage activity were determined. For ecological studies, the influence of different phage concentrations on the nodulation ability of sensitive strains and the effect of the phage on competition between nodulating and non-nodulating strains were examined.

Electron microscopic studies revealed that the phage had a polyhedral head, 35.7nm long and 37.2nm in diameter, and a non-contractile tail (59.5 x 4.5nm). The adsorption studies showed that JRW3 phage had an adsorption rate constant, K , of $3 \times 10^9 \text{ cm}^{-2}\text{min}^{-1}$ and the

-11-

one step growth pattern indicated a latent period of 12 hrs. and a burst size of 28 particles.

JRW3 was found to require 0.1mM calcium ions for optimum growth. Host range analysis showed that eight of the forty two Rhizobium and Bradyrhizobium strains tested were sensitive to phage infection. JRW3 phage was highly sensitive to heat and U.V. light. This phage survived well between pH 5 and 8 and was stable in EDTA, though completely inactivated in sodium citrate.

Ecological studies indicated that when the phage was present at 10:1 (phage : cell), there was a significant decrease in the nodulation ability of the sensitive strains tested. In competition studies, the presence of JRW3 phage enhanced the suppression of nodulation of nodulating strains of cowpea rhizobia by non-nodulating Sm^D mutant.