RESEARCH PAPER

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Optimization of liquid phospho bacteria required for maize seeds

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The survival of the *Bacillus cultures* on the seeds of the maize was tried in different combinations. One ml inoculum with one ml adhesive combination or sterile water showed better results followed by 1.5 ml inoculum with 0.5 ml adhesive or sterile water. In 1.5 ml inoculum and 0.5 ml adhesive combination, adherence and survival population of phosphobacterial cells were maximum (6.5 x 10^5 cfu/seed) for the treatment of sporulated inoculum with rice gruel.

Key words : Phosphobacteria, Liquid inoculum, Maize

INTRODUCTION

Generally 5-30% yield increase have been recorded from various crops by phosphate solubilizing bacterial inoculation particularly in crops, *viz*. paddy, wheat, potato and soybean either through seed bacterization or soil application (Datta *et al.*, 1982). The adherence and survival of sporulated *Bacillus* culture on the seeds of blackgram, greengram, soybean, maize and paddy showed maximum population in all seeds when inoculated with rice gruel (Sumathy, 2001). Seed treatment of cumbu and blackgram with the mixed inoculants of *Azospirillum* and *phosphobacteria* / *Rhizobium* and phosphobacteria, respectively revealed of individual organisms survived up to 24h on the seeds (Poonguzhali, 2002).

MATERIALS AND METHODS

The sporulated inoculum of Bacillus sp. (PB-1) and its log phase cells were used for the study.

The treatments details for maize of this experiment are as follows:

0.5% of inoculum:

T_1 - 0.5ml of vegetative cell + 1.5ml of sterile water, T_2- 0.5ml of vegetative cell + 1.5ml of rice gruel, T_3- Direct seed application of vegetative cells as such (2 %), T_4- 0.5ml of sporulated inoculum+1.5ml of sterile water, T_5- 0.5ml of sporulated inoculum+1.5ml of rice gruel, T_6 - Direct seed application of sporulated inoculum as such (2 %)

1 % of inoculum:

T_1 - 1ml of vegetative cell + 1ml of sterile water, T_2-1ml of vegetative cell + 1ml of rice gruel, T_3- Direct seed application of vegetative cells as such (2 %), T_4 - 1ml of sporulated inoculum + 1ml of sterile water, T_5- 1 ml of sporulated inoculum + 1 ml of rice gruel, T_6- Direct seed application of sporulated inoculum as such (2 %)

1.5% of inoculum:

T_1 - 1.5ml of vegetative cell + 0.5ml of sterile water, T_2- 1.5ml of vegetative cell + 0.5ml of rice gruel, T_3- Direct seed application of vegetative cells as such (2 %), T_4-0.5ml of sporulated inoculum + 0.5ml of sterile water, T_5- 1.5ml of sporulated inoculum + 0.5ml of rice gruel, T_6- Direct seed application of sporulated inoculum as such (2 %)

The seeds were coated with the inoculum by preparing slurry. A sample size of 20 seeds were taken in each treatment for examining the survival and adherence at 0, 12, 24, 36, 48, 60 and 72 hr of inoculation at room temperature. The number of cells adhered per seed was calculated using serial dilution and plating technique and the results were expressed as cfu/seed.

RESULTS AND DISCUSSION

Application of inoculum to the seeds of host plants is still the usual practice with carrier based bacterial inoculants (Graham Weiss *et al.*, 1987). Just prior to sowing, mixing of inoculant with seeds is followed. Sometimes to improve stickiness adhesive is added. (Fages, 1994; Jauhri, 2001). The results of seed treatment of maize using vegetative cells and sporulated *Bacillus cultures* are given in Table 1, 2 and 3.

The results of 0.5 ml inoculum and 1.5 ml adhesive combination are presented in Table 1.

Sporulated inoculum with rice gruel showed maximum number of population (3.5 x 10^5 cfu/seed) and adherence were noticed even after 60th hr whereas without adhesive the population drastically reduced after