SII-1-1

ENVIRONMENTAL AND PHYSIOLOGICAL STUDIES ON SURVIVAL OF PHA-PRODUCING BACTERIA

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Effects of PHA(polyhydroxyalkanoate) on the survival of PHA-producing bacteria were investigated. In various soil samples, PHA concentration and environmental factors affecting PHA production were analyzed. PHA was within the range of 0.05 - 12.5 % of total organic carbon. PHA production was accelerated in low pH, nitrogen or phosphorus deficient, or low bacterial activities in soil samples, and these results coincided with studies on bacteria isolated from natural environment. To study the relationship between PHA production and survival of bacteria, PHA-producing bacteria and PHA negative mutant were cultured in various conditions. The PHA-producing bacteria grew rapidly, but the PHA negative mutant grew very slowly in glucose supplemented media. pH in the media cultured PHA negative mutant was decreased, and no pH relieves were observed. It is inferred that PHA production optimizes the pH of media. When the PHA-producing bacteria and PHA negative mutant were cultured in stressed conditions such as carbon-depleted media, high salt, high temperature, and low pH, the survival of the PHA-producing bacteria was higher than that of the PHA mutant. These results indicated that PHA production increases the survival of bacteria.

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PHYSIOLOGIC AND GENETIC CONTROL OF *afsR2*-DEPENDENT ACTINORHODIN PRODUCTION IN *STREPTOMYCES LIVIDANS*

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The blue pigment antibiotic actinorhodin (Act) is made only in limited amounts by wild type *Streptomyces lividans*, distingusihing thes species from its highly pigmented relative, *S. Coelicolor*. However, overespression of two genes, *afsR2* and *afsR* stimulates the production of Act in *S. lividans* to levels approximating those of *S. coelicolor*. Here we show that the biosynthesis of Act by *S. lividans* carrying a single chromosomal copy of *afsR2* is increased dramatically by growth on minimal media plates contining glycerol as a cole carbon source, that this increase is mediated by *afsR*-promoted trasncription of *afsR2* during morphological differentiation. In liquid cultures where *S. lividans* does not differentiate, however, Act was produced in minimal media in the absence of both *afsR* and *afsR2*. Our results, which suggest that *afsR2* expression is developmentally controlled and dependent on *afsR* function, indicate that the synthesis of Act in *S. lividans* is mediated by parallel and independent genetic pathways that respond differentially to specific physiological and developmental signals.