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Review

Industrial strain improvement: Mutagenesis and random screening procedures

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Abstract

Industrial strain improvement plays a central role in the commercial development of microbial fermentation processes. In recent years new procedures such as rational screening and genetic engineering have begun to make a significant contribution to this activity but mutagenesis and selection - so-called "random screening"™ - is still a cost-effective procedure, and for reliable short-term strain development is frequently the method of choice. The current practice of strain improvement by mutagenesis and selection is a highly developed technique drawing on the latest advances from a wide range of scientific and technical disciplines. Mutagenic procedures can be optimized in terms of type of mutagen and dose, mutagen specificity effects can be taken into account and mutagenesis itself can be enhanced or directed in order to obtain the maximum frequency of desirable mutant types among the isolates to be screened.

Screens can be designed to allow maximum expression of the desirable mutant types and the application of statistically-based screening procedures will maximize the probability of detecting them. Automated procedures can be developed using robotics and microprocessors to increase the numbers of isolates that can be processed through a screen per unit time. The relationship between screening and production conditions can be organized so as to minimize the probability of improved isolates selected by the screen failing to scale up.



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Keywords

Fermentation; strain improvement; mutagenesis; expression; random screening; multi-level screening; recycling; automated screening; scale-up

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