developing new processes to improve the lactic acid titer and productivity are essential for industrial production of lactic acid from lignocelulose sugars.

Summary of the invention

[0010] According to the invention there have been isolated new strains of *Bacillus coagulans* which can directly or in form of their functional mutants overcome the deficiencies of the cited references above.

[0010a] In one aspect, there is provided *Bacillus coagulans* strain C106 deposited under Accession No. PTA-13254 or a functional mutant thereof.

[0010b] In another aspect, there is provided a method of producing lactic acid from a carbohydrate source, comprising the steps of:(i) contacting said carbohydrate source with at least one *Bacillus coagulans* strain selected from the group consisting of *Bacillus coagulans* strain C106 deposited under Accession No. PTA-13254; and a functional mutant thereof to form lactic acid;(ii) isolating said lactic acid.

[0010c] In another aspect, there is provided a seed inoculum comprising *Bacillus coagulans* strain C106 deposited under Accession No. PTA-13254 or a functional mutant thereof.

[0010d] In yet another aspect, there is provided a kit comprising at least one *Bacillus coagulans* strain of the present invention, together with instructions for use.

[0010e] In a further aspect, there is provided a kit comprising at least one seed inoculum of the present invention, together with instructions for use.

DEFINITIONS

[0011] Unless otherwise defined herein, scientific and technical terms used in this application shall have the meanings that are commonly understood by those of ordinary skill in the art. Generally, nomenclature used in connection with, and techniques of, chemistry, cell and tissue culture, molecular biology, cell and cancer biology, neurobiology, neurochemistry, virology, immunology, microbiology, pharmacology, genetics and protein and nucleic acid chemistry, described herein, are those well-known and commonly used in the art.

[0012] Unless the context requires otherwise or specifically stated to the contrary, integers, steps, or elements of the invention recited herein as singular integers, steps or elements clearly encompass both singular and plural forms of the recited integers, steps or elements.

[0013] Throughout this specification and claims, unless the context requires otherwise, the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated step or element or integer or group of steps or elements or integers, but not to the exclusion of any

Claims

1. *Bacillus coagulans* strain C106 deposited under Accession No. PTA-13254 or a functional mutant thereof.

2. A *Bacillus coagulans* strain according to claim 1, which is biologically pure.

3. A method of producing lactic acid from a carbohydrate source, comprising the steps of:
(i) contacting said carbohydrate source with at least one *Bacillus coagulans* strain selected from the group consisting of *Bacillus coagulans* strain C106 deposited under Accession No. PTA-13254; and a functional mutant thereof to form lactic acid;
(ii) isolating said lactic acid.

4. The method of claim 3, further comprising, prior to step (ii), the step of incubating the carbohydrate source with at least one *Bacillus coagulans* strain selected from the group consisting of *Bacillus coagulans* strain C106 deposited under Accession No. PTA-13254and a functional mutant thereof.

5. The method of any one of claims 3 to 4, wherein said carbohydrate source is selected from the group consisting of lignocellulose, hemicellulose, D/L-glucose, D/L-galactose, D/L-mannose, D/L-arabinose, D/L-lyxose, D/L-ribose, D/L-xylose, D/L-ribulose, D/L-xylulose, saccharides and polysaccharides thereof.

6. The method of claim 5 wherein the carbohydrate source is L-xylose.

7. The method of any one of claims 3 to 6, wherein the said at least one *Bacillus coagulans* strain is C106 deposited under Accession No. PTA-13254.

8. The method of any one of claims 3 to 7, wherein the lactic acid is L-lactic acid.

9. The method of claim 8, wherein the optical purity of said isolated L-lactic acid is greater than 99%.

10. The method of claim 8 or claim 9, wherein the titer of isolated L-lactic acid is in the range selected from the group consisting of 50 to 150g/L, 60 to 140g/L, 70 to 130g/L, 80 to 130g/L, 90 to 130g/L, and 100 to 130 g/L.

11. The method of any one of claims 8 to 10, wherein the production of L-lactic is in the range selected from the group consisting of 1 to 8g/L/hour, 2 to 7g/L/hour, 3 to 6g/L/hour, and 4 to 5g/L/hour.

12. The method of any one of claims 8 to 11, wherein the yield of said isolated L-lactic acid is greater than 90%.

13. The method of any one of claims 4 to 12 wherein said at least one *Bacillus coagulans* strain is incubated with said carbohydrate source at a temperature of from 50-55°C.

14. The method of any one of claims 4 to 13 wherein said at least one *Bacillus coagulans* strain is incubated

with said carbohydrate source for a period of time from 24 to 72 hours.

15. A seed inoculum comprising *Bacillus coagulans* strain C106 deposited under Accession No. PTA-13254 or a functional mutant thereof.

16. The seed inoculum of claim 15, further comprising a carrier.

17. The seed inoculum of claim 16, wherein the carrier is an aqueous medium.

18. A kit comprising at least one *Bacillus coagulans* strain as claimed in claim 1 or 2, together with instructions for use.

19. A kit comprising at least one seed inoculum as claimed in any one of claims 15 to 17, together with instructions for use.