What is claimed is:

1. A method for inducing production of a biomass degrading enzyme comprising contacting a microorganism that produces the biomass degrading enzyme with a composition comprising a caramelized sugar product under conditions sufficient for production of a biomass degrading enzyme.

2. The method of claim 1, wherein the microorganism is in a cell culture.

3. The method of claim 2, wherein sugar is added to the cell culture prior to contacting the microorganism with the composition comprising a caramelized sugar product.

4. The method of claim 3, wherein the microorganism is contacted with the composition comprising a caramelized sugar product when the cell culture is substantially free from sugar.

5. The method of claims 1 or 4, wherein the caramelized sugar product is produced by caramelizing glucose, xylose, maltose, lactose, or a combination thereof.

6. The method of claims 1or 5, wherein the caramelized sugar product comprises oligosaccharides, dehydration products of the oligosaccharides, hydration products of the oligosaccharides, disproportionation products of the oligosaccharides, colored aromatic products, or any combination thereof.

7. The method of any of claims 1-5, wherein the biomass degrading enzyme comprises an amylase, e.g., an alpha, beta or gamma amylase, an endoglucanase, an exoglucanase, a cellobiase, a cellobiohydrolase, a xylanase, a ligninase, or a hemicellulase, or a combination thereof.

8. The method of any of claims 1-5 and 7, wherein the composition further comprises an inducer biomass.

9. The method of claim 1, wherein the composition further comprises cellobiose, β-cellobiono-1,5-lactone, lactose, D-xylose, xylobiose, galactose, and sophorose.

10. The method of any of claims 1-5 and 9, wherein the microorganism that produces a biomass degrading enzyme is from a species in the genera selected from *Bacillus, Coprinus, Myceliophthora, Cephalosporium, Scytalidium, Penicillium, Aspergillus, Pseudomonas, Humicola, Fusarium, Thielavia, Acremonium, Chrysosporium* or *Trichoderma*.

11. The method of any of claims 1-5, 9, and 10, wherein the biomass degrading enzyme comprises one or more, or all, of the enzymes listed in Table 1.

12. The method of claim 1, further comprising separating the biomass degrading enzyme from a component of the cell culture, e.g., the microorganism or remaining inducer biomass, e.g., by chromatography or filtration.

13. A method for producing a product (e.g., hydrogen, a sugar, an alcohol) from a biomass, comprising:
    a) inducing the production of a biomass degrading enzyme using a method according to claim 1;
    b) providing a biomass; and
    c) contacting the biomass with the microorganism of step (a) or the biomass degrading enzyme that has been separated or purified from the microorganism of step (a), under conditions suitable for production of the product.

14. The method of claim 13, wherein the product is glucose and/or xylose.

15. The method of claim 13, further comprising isolating the product.

16. The method of any of claims 13-15, wherein the biomass degrading enzyme comprises one or more, or all, of the enzymes listed in Table 1.

17. The method of claim 13, wherein the caramelized sugar product is produced by caramelizing glucose, maltose, xylose, lactose, or a combination thereof.

18. The method of claims 13 or 17, wherein the caramelized sugar product comprises oligosaccharides, dehydration products of the oligosaccharides, hydration products of the

oligosaccharides, disproportionation products of the oligosaccharides, colored aromatic products, or any combination thereof.

19. The method of claim 18, wherein the composition further comprises an inducer biomass.

20. The method of claim 13, wherein the composition further comprises cellobiose, β-cellobiono-1,5-lactone, lactose, D-xylose, xylobiose, galactose, and sophorose.

21. The method of any of claims 13-20, wherein the microorganism that produces a biomass degrading enzyme is from species in the genera selected from *Bacillus, Coprinus, Myceliophthora, Cephalosporium, Scytalidium, Penicillium, Aspergillus, Pseudomonas, Humicola, Fusarium, Thielavia, Acremonium, Chrysosporium* or *Trichoderma*.

22. The method of any of claims 13-21, wherein the microorganism is *T. reesei* or a variant thereof.

23. A composition comprising a caramelized sugar product for use in the method of any of claims 1-22.

24. The composition of claim 23, wherein the caramelized sugar product is produced by caramelizing glucose, maltose, xylose, lactose, or a combination thereof.

25. The composition of claim 23 further comprising an inducer biomass.

26. The composition of claim 25 wherein the composition further comprises cellobiose, β-cellobiono-1,5-lactone, lactose, D-xylose, xylobiose, galactose, and sophorose.

27. A cell culture comprising a microorganism capable of producing a biomass degrading enzyme and a caramelized sugar product.

28. The cell culture of claim 27, further comprising cell culture media.

29. The cell culture of claim 27, wherein the biomass degrading enzyme comprises one or more, or all, of the enzymes listed in Table 1.

30. The cell culture of claim 27, wherein the microorganism is *T. reesei* or a variant thereof, e.g., RUTC30.

31. The cell culture of claim 27, further comprising an inducer biomass.