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(54) Titre : PRODUCTION ET COMPOSITION DE SIROP DE FRUCTOSE
(54) Title: PRODUCTION AND COMPOSITION OF FRUCTOSE SYRUP

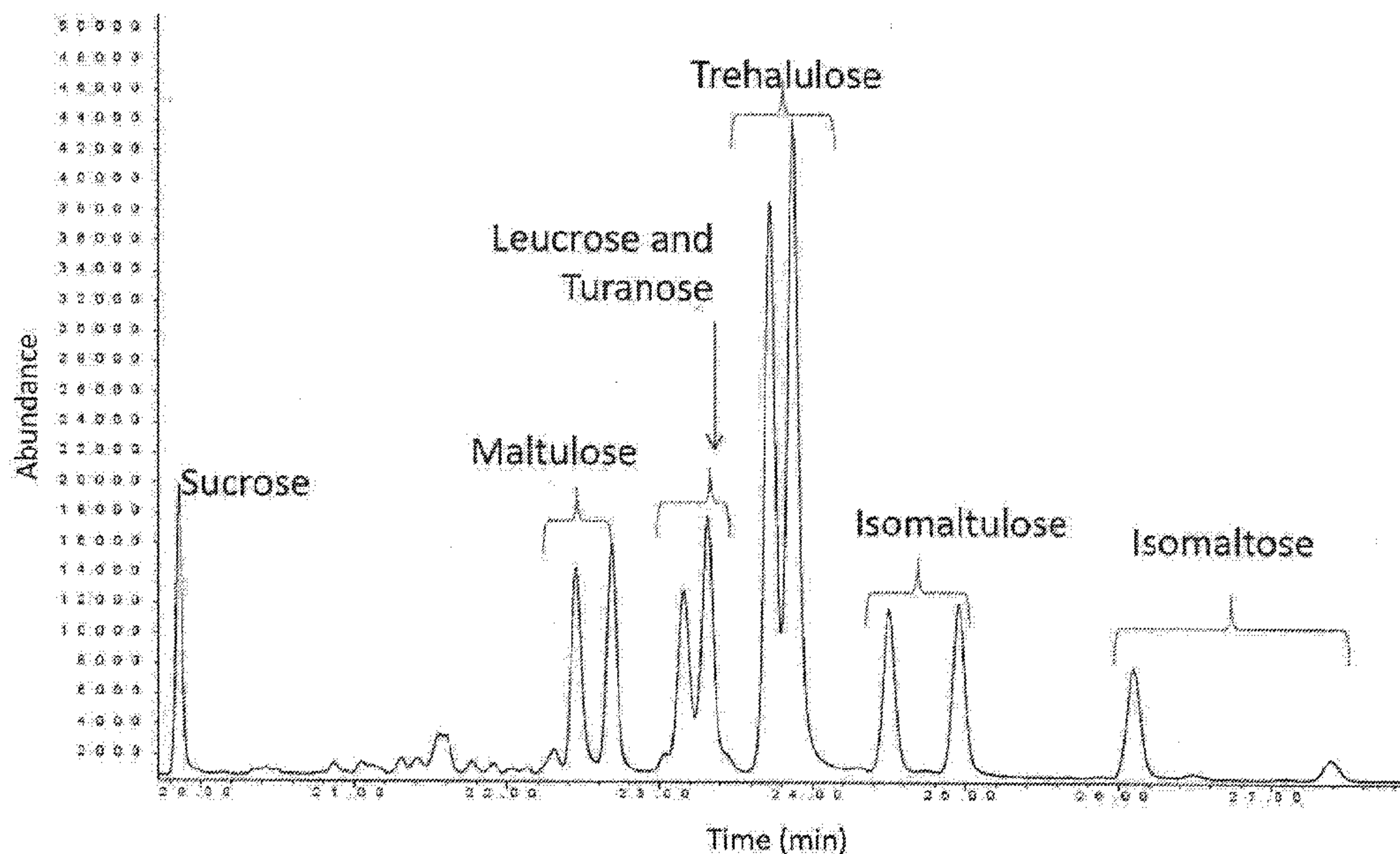


FIG. 1

(57) **Abrégé/Abstract:**

Disclosed herein are aqueous compositions comprising fructose and methods of production thereof. A method for producing an aqueous composition comprising fructose can comprise, for example, conducting an enzymatic reaction by contacting water, sucrose, and a glucosyltransferase enzyme that synthesizes poly alpha-1,3- glucan having at least 30% alpha-1,3-linkages. A soluble fraction produced by such a reaction comprises at least about 55% fructose on a dry weight basis, and can be separated from insoluble poly alpha-1,3-glucan product(s), thereby providing an aqueous composition comprising fructose.

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[Continued on next page]

(54) Title: PRODUCTION AND COMPOSITION OF FRUCTOSE SYRUP

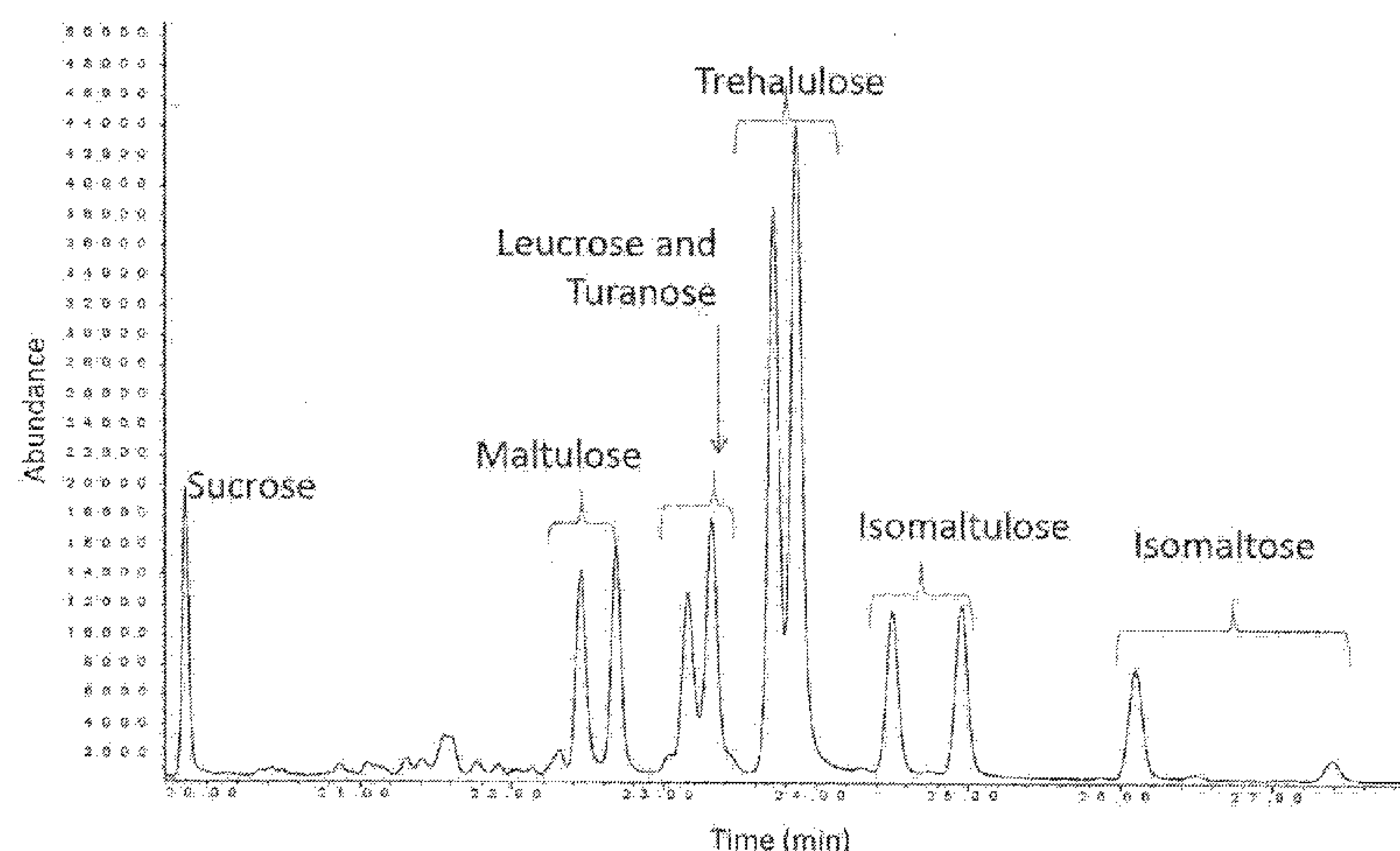


FIG. 1

(57) Abstract: Disclosed herein are aqueous compositions comprising fructose and methods of production thereof. A method for producing an aqueous composition comprising fructose can comprise, for example, conducting an enzymatic reaction by contacting water, sucrose, and a glucosyltransferase enzyme that synthesizes poly alpha-1,3- glucan having at least 30% alpha-1,3-linkages. A soluble fraction produced by such a reaction comprises at least about 55% fructose on a dry weight basis, and can be separated from insoluble poly alpha-1,3-glucan product(s), thereby providing an aqueous composition comprising fructose.

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Dupont Nutrition Biosciences APS

<120> PRODUCTION AND COMPOSITION OF FRUCTOSE SYRUP

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<140> PCT/US2016/066517

<141> 2016-12-14

<150> US14/967,659

<151> 2015-12-14

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<170> PatentIn version 3.5

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 Tyr Tyr Gly Asp Leu Tyr Thr Asp Asp Gly His Tyr Met Glu Thr Lys
 645 650 655
 Ser Pro Tyr Tyr Asp Thr Ile Val Asn Leu Met Lys Ser Arg Ile Lys
 660 665 670

Tyr Val Ser Gly Gly Gln Ala Gln Arg Ser Tyr Trp Leu Pro Thr Asp
 675 680 685
 Gly Lys Met Asp Asn Ser Asp Val Glu Leu Tyr Arg Thr Asn Glu Val
 690 695 700
 Tyr Thr Ser Val Arg Tyr Gly Lys Asp Ile Met Thr Ala Asn Asp Thr
 705 710 715 720
 Glu Gly Ser Lys Tyr Ser Arg Thr Ser Gly Gln Val Thr Leu Val Ala
 725 730 735
 Asn Asn Pro Lys Leu Asn Leu Asp Gln Ser Ala Lys Leu Asn Val Glu
 740 745 750
 Met Gly Lys Ile His Ala Asn Gln Lys Tyr Arg Ala Leu Ile Val Gly
 755 760 765
 Thr Ala Asp Gly Ile Lys Asn Phe Thr Ser Asp Ala Asp Ala Ile Ala
 770 775 780
 Ala Gly Tyr Val Lys Glu Thr Asp Ser Asn Gly Val Leu Thr Phe Gly
 785 790 795 800
 Ala Asn Asp Ile Lys Gly Tyr Glu Thr Phe Asp Met Ser Gly Phe Val
 805 810 815
 Ala Val Trp Val Pro Val Gly Ala Ser Asp Asn Gln Asp Ile Arg Val
 820 825 830
 Ala Pro Ser Thr Glu Ala Lys Lys Glu Gly Glu Leu Thr Leu Lys Ala
 835 840 845
 Thr Glu Ala Tyr Asp Ser Gln Leu Ile Tyr Glu Gly Phe Ser Asn Phe
 850 855 860
 Gln Thr Ile Pro Asp Gly Ser Asp Pro Ser Val Tyr Thr Asn Arg Lys
 865 870 875 880
 Ile Ala Glu Asn Val Asp Leu Phe Lys Ser Trp Gly Val Thr Ser Phe
 885 890 895
 Glu Met Ala Pro Gln Phe Val Ser Ala Asp Asp Gly Thr Phe Leu Asp
 900 905 910
 Ser Val Ile Gln Asn Gly Tyr Ala Phe Ala Asp Arg Tyr Asp Leu Ala
 915 920 925
 Met Ser Lys Asn Asn Lys Tyr Gly Ser Lys Glu Asp Leu Arg Asp Ala
 930 935 940
 Leu Lys Ala Leu His Lys Ala Gly Ile Gln Ala Ile Ala Asp Trp Val
 945 950 955 960
 Pro Asp Gln Ile Tyr Gln Leu Pro Gly Lys Glu Val Val Thr Ala Thr
 965 970 975
 Arg Thr Asp Gly Ala Gly Arg Lys Ile Ala Asp Ala Ile Ile Asp His
 980 985 990
 Ser Leu Tyr Val Ala Asn Ser Lys Ser Ser Gly Lys Asp Tyr Gln Ala
 995 1000 1005
 Lys Tyr Gly Gly Glu Phe Leu Ala Glu Leu Lys Ala Lys Tyr Pro
 1010 1015 1020
 Glu Met Phe Lys Val Asn Met Ile Ser Thr Gly Lys Pro Ile Asp
 1025 1030 1035
 Asp Ser Val Lys Leu Lys Gln Trp Lys Ala Glu Tyr Phe Asn Gly
 1040 1045 1050
 Thr Asn Val Leu Glu Arg Gly Val Gly Tyr Val Leu Ser Asp Glu
 1055 1060 1065
 Ala Thr Gly Lys Tyr Phe Thr Val Thr Lys Glu Gly Asn Phe Ile
 1070 1075 1080
 Pro Leu Gln Leu Thr Gly Lys Glu Lys Val Ile Thr Gly Phe Ser
 1085 1090 1095
 Ser Asp Gly Lys Gly Ile Thr Tyr Phe Gly Thr Ser Gly Thr Gln
 1100 1105 1110

Ala Lys	Ser Ala Phe Val Thr	Phe Asn Gly Asn Thr	Tyr Tyr Phe
1115	1120	1125	
Asp Ala	Arg Gly His Met Val	Thr Asn Ser Glu Tyr	Ser Pro Asn
1130	1135	1140	
Gly Lys	Asp Val Tyr Arg Phe	Leu Pro Asn Gly Ile	Met Leu Ser
1145	1150	1155	
Asn Ala	Phe Tyr Ile Asp Ala	Asn Gly Asn Thr Tyr	Leu Tyr Asn
1160	1165	1170	
Ser Lys	Gly Gln Met Tyr Lys	Gly Gly Tyr Thr Lys	Phe Asp Val
1175	1180	1185	
Ser Glu	Thr Asp Lys Asp Gly	Lys Glu Ser Lys Val	Val Lys Phe
1190	1195	1200	
Arg Tyr	Phe Thr Asn Glu Gly	Val Met Ala Lys Gly	Val Thr Val
1205	1210	1215	
Ile Asp	Gly Phe Thr Gln Tyr	Phe Gly Glu Asp Gly	Phe Gln Ala
1220	1225	1230	
Lys Asp	Lys Leu Val Thr Phe	Lys Gly Lys Thr Tyr	Tyr Phe Asp
1235	1240	1245	
Ala His	Thr Gly Asn Gly Ile	Lys Asp Thr Trp Arg	Asn Ile Asn
1250	1255	1260	
Gly Lys	Trp Tyr Tyr Phe Asp	Ala Asn Gly Val Ala	Ala Thr Gly
1265	1270	1275	
Ala Gln	Val Ile Asn Gly Gln	Lys Leu Tyr Phe Asn	Glu Asp Gly
1280	1285	1290	
Ser Gln	Val Lys Gly Gly Val	Val Lys Asn Ala Asp	Gly Thr Tyr
1295	1300	1305	
Ser Lys	Tyr Lys Glu Gly Phe	Gly Glu Leu Val Thr	Asn Glu Phe
1310	1315	1320	
Phe Thr	Thr Asp Gly Asn Val	Trp Tyr Tyr Ala Gly	Ala Asn Gly
1325	1330	1335	
Lys Thr	Val Thr Gly Ala Gln	Val Ile Asn Gly Gln	His Leu Tyr
1340	1345	1350	
Phe Asn	Ala Asp Gly Ser Gln	Val Lys Gly Gly Val	Val Lys Asn
1355	1360	1365	
Ala Asp	Gly Thr Tyr Ser Lys	Tyr Asn Ala Ser Thr	Gly Glu Arg
1370	1375	1380	
Leu Thr	Asn Glu Phe Phe Thr	Thr Gly Asp Asn Asn	Trp Tyr Tyr
1385	1390	1395	
Ile Gly	Ala Asn Gly Lys Ser	Val Thr Gly Glu Val	Lys Ile Gly
1400	1405	1410	
Asp Asp	Thr Tyr Phe Phe Ala	Lys Asp Gly Lys Gln	Val Lys Gly
1415	1420	1425	
Gln Thr	Val Ser Ala Gly Asn	Gly Arg Ile Ser Tyr	Tyr Tyr Gly
1430	1435	1440	
Asp Ser	Gly Lys Arg Ala Val	Ser Thr Trp Ile Glu	Ile Gln Pro
1445	1450	1455	
Gly Val	Tyr Val Tyr Phe Asp	Lys Asn Gly Leu Ala	Tyr Pro Pro
1460	1465	1470	
Arg Val	Leu Asn		
1475			

CLAIMSWhat is claimed is:

1. A method for producing an aqueous composition comprising fructose, said method comprising:
 - 5 (a) contacting water, sucrose, and a glucosyltransferase enzyme that synthesizes poly alpha-1,3-glucan having at least 30% alpha-1,3-linkages to produce a soluble fraction and an insoluble fraction, wherein the insoluble fraction comprises said poly alpha-1,3-glucan, and wherein the soluble fraction comprises at least about 55% fructose on a dry

10 weight basis, and
 - (b) separating the soluble fraction from the insoluble fraction, thereby providing an aqueous composition comprising fructose.
- 15 2. The method of claim 1, wherein the glucosyltransferase enzyme synthesizes poly alpha-1,3-glucan having at least 95% alpha-1,3-linkages.
3. The method of claim 1, wherein the soluble fraction further comprises soluble oligosaccharides with a degree of polymerization (DP) of 2 to about 15.
- 20 4. The method of claim 3, wherein the soluble fraction comprises less than about 30% of said soluble oligosaccharides on a dry weight basis.
5. The method of claim 3, further comprising contacting the soluble fraction with an alpha-glucosidase enzyme to hydrolyze at least one glycosidic linkage of said

25 oligosaccharides, thereby increasing the monosaccharide content in the soluble fraction.
6. The method of claim 1, wherein the soluble fraction comprises at least about 75% fructose on a dry weight basis.
- 30 7. The method of claim 1, wherein the method further comprises a process step that increases the content of monosaccharides relative to the content of other

saccharides in the soluble fraction, wherein the process step optionally is nanofiltration or enzymatic hydrolysis.

8. The method of claim 1, wherein the method does not comprise chromatography as a process step to increase the content of fructose relative to the content of other saccharides in the soluble fraction
9. An aqueous composition produced by a method according to claim 1.
10. The aqueous composition of claim 9, wherein the aqueous composition is comprised within, or is, an ingestible product, and optionally is used as a sweetener of the ingestible product.
11. An aqueous composition comprising:
 - (i) at least about 55% fructose on a dry weight basis,
 - (ii) about 3% to about 24% glucose on a dry weight basis, and
 - (iii) soluble oligosaccharides with a degree of polymerization (DP) of 2 to about 15, wherein said oligosaccharides comprise glucose and/or fructose.
12. The aqueous composition of claim 11, wherein the soluble oligosaccharides are selected from the group consisting of sucrose, leucrose, trehalulose, isomaltulose, maltulose, isomaltose, and nigerose.
13. The aqueous composition of claim 11, wherein said oligosaccharides comprise (i) at least about 90 wt% glucose, and (ii) about 60-99% alpha-1,3 and about 1-40% alpha-1,6 glucosidic linkages.
14. The aqueous composition of claim 11, wherein the aqueous composition comprises at least about 75% fructose on a dry weight basis.
15. The aqueous composition of claim 11, wherein the aqueous composition comprises less than about 30% of said soluble oligosaccharides on a dry weight basis.

16. The aqueous composition of claim 11, wherein the aqueous composition is comprised within, or is, an ingestible product, and optionally is used as a sweetener of the ingestible product.

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17. The aqueous composition of claim 16, wherein the aqueous composition has a conductivity less than about 50 $\mu\text{S}/\text{cm}$ at about 30 wt% dry solids and an ICUMSA value less than about 50.

- 10 18. An ingestible product comprising the aqueous composition of claim 11, wherein the ingestible product is a food, beverage, animal feed, human or animal nutritional product, pharmaceutical product, or oral care product.

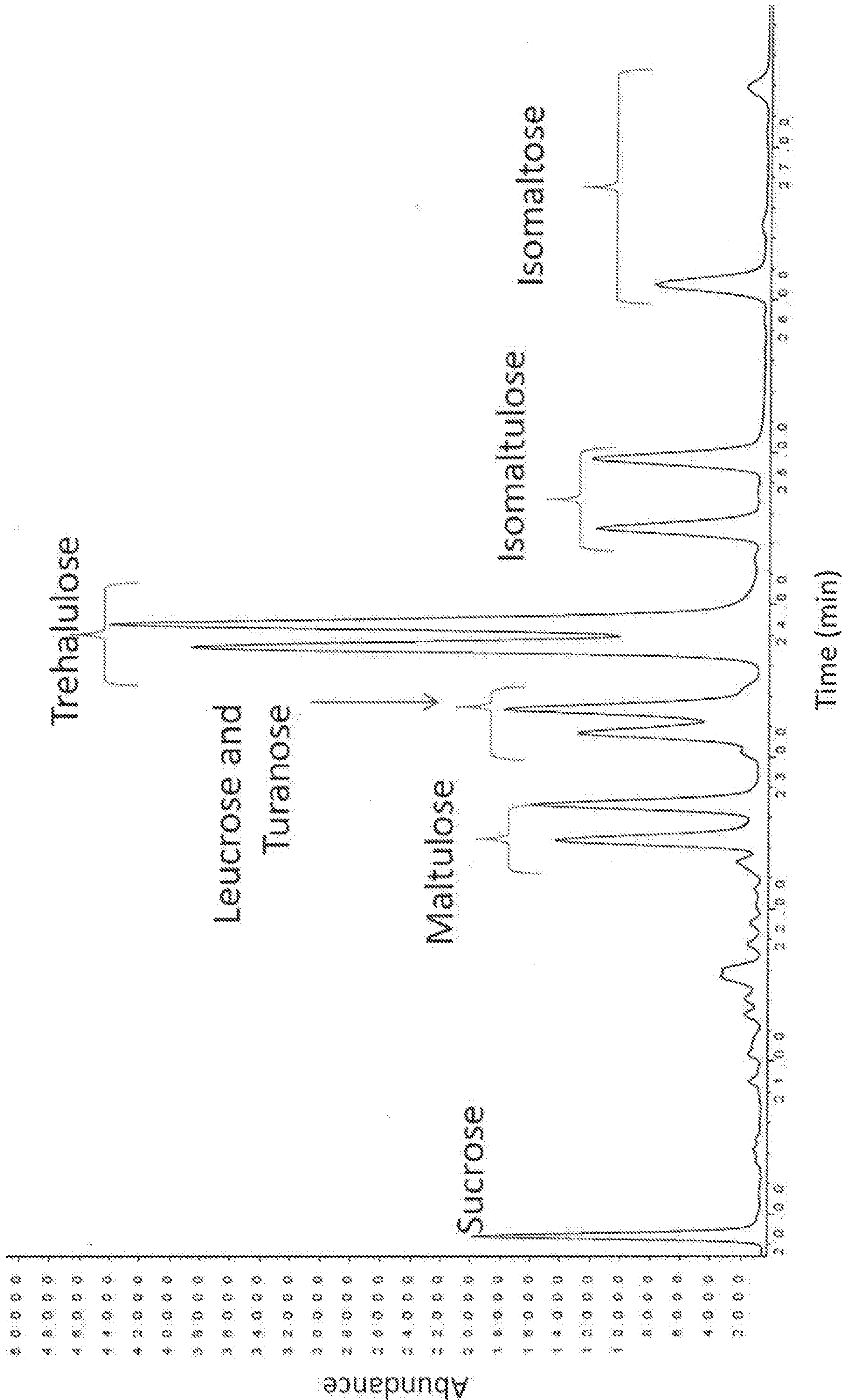


FIG. 1

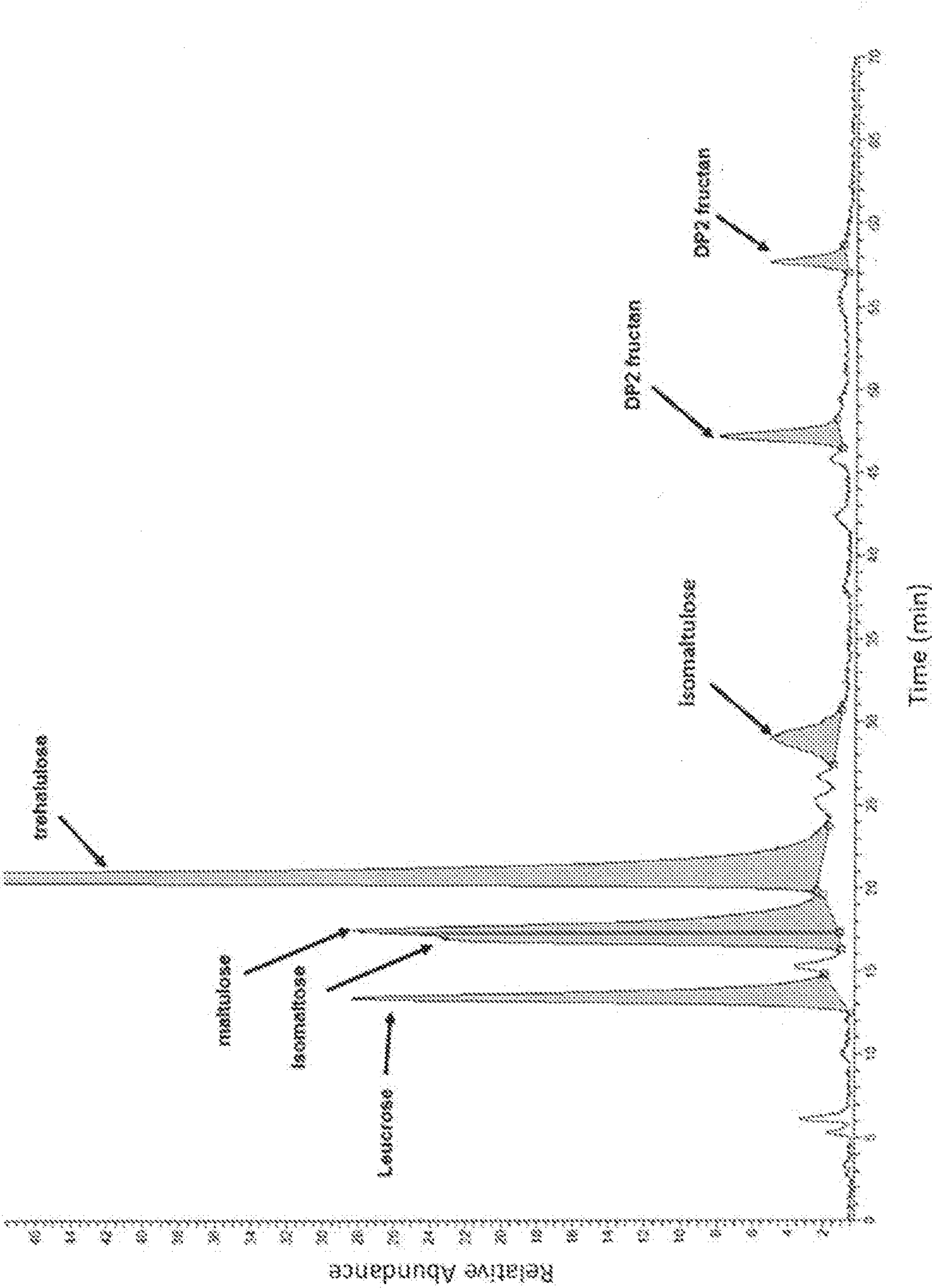


FIG. 2

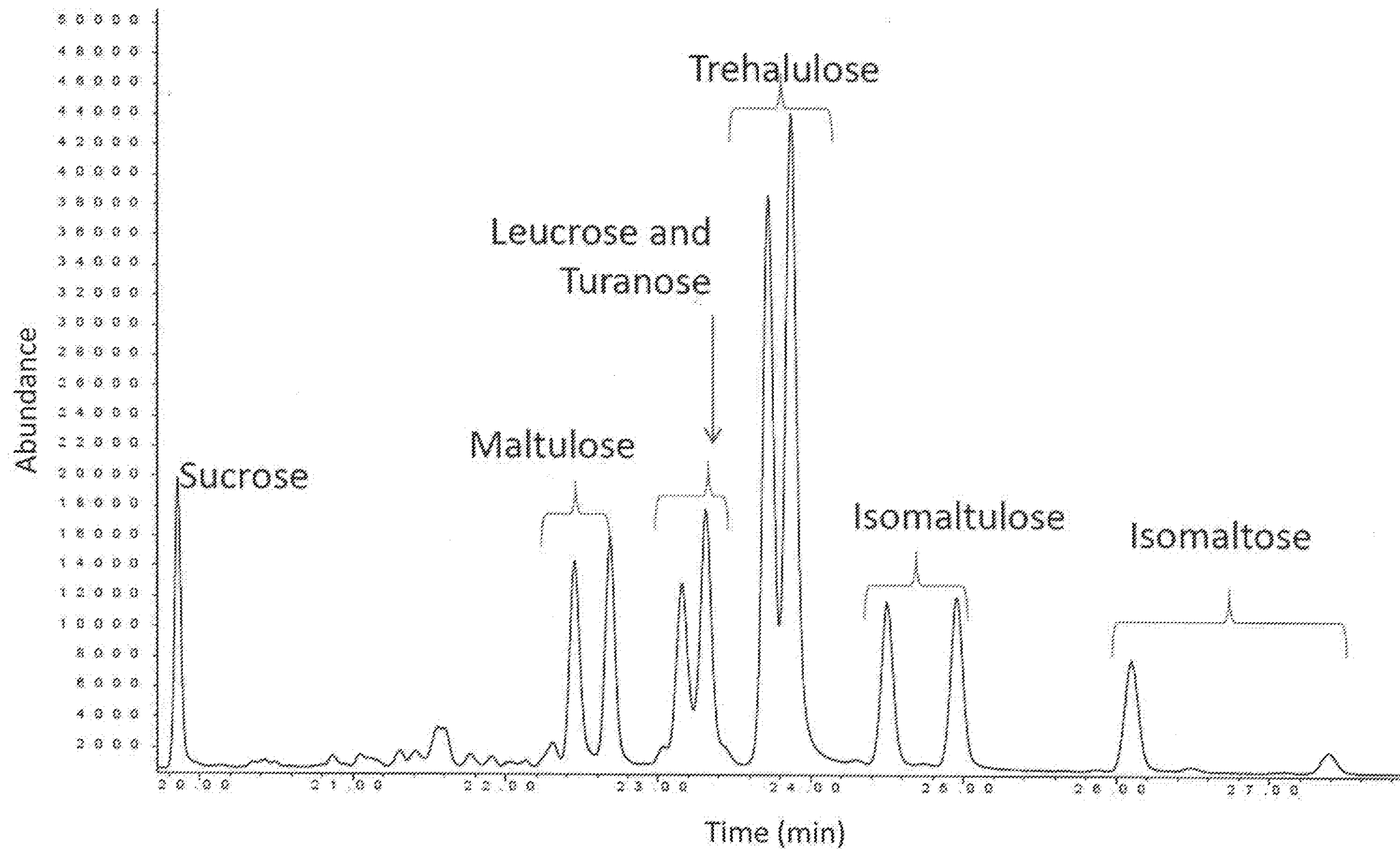


FIG. 1