

13C-NMR Spectroscopy of Polyglutamic Acid Produced by *Bacillus Subtilis*:  
Characteristics, Chemical Properties and Biological Functions

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Citation Report

#	ARTICLE	IF	CITATIONS
1	Effects of temperature and pH on adsorption of basic brown 1 by the bacterial biopolymer poly( $\gamma$ -glutamic acid). <i>Bioresource Technology</i> , 2008, 99, 1026-1035.	4.8	50
2	Adsorption of toxic mercury(II) by an extracellular biopolymer poly( $\gamma$ -glutamic acid). <i>Bioresource Technology</i> , 2009, 100, 200-207.	4.8	214
3	<i>In Vitro</i> Binding of Heavy Metals by an Edible Biopolymer Poly( $\gamma$ -glutamic acid). <i>Journal of Agricultural and Food Chemistry</i> , 2009, 57, 777-784.	2.4	46
4	Antibacterial activity and biocompatibility of a chitosan- $\gamma$ -poly(glutamic acid) polyelectrolyte complex hydrogel. <i>Carbohydrate Research</i> , 2010, 345, 1774-1780.	1.1	140
5	Controlled Release of Doxorubicin from Doxorubicin- $\gamma$ -Polyglutamic Acid Ionic Complex. <i>Journal of Nanomaterials</i> , 2010, 2010, 1-9.	1.5	111
6	Inhibition Effect of Poly( $\gamma$ -glutamic acid) on Lead-Induced Toxicity in Mice. <i>Journal of Agricultural and Food Chemistry</i> , 2010, 58, 12562-12567.	2.4	12
7	Softening bioactive glass for bone regeneration: sol-gel hybrid materials. <i>Soft Matter</i> , 2011, 7, 5083.	1.2	128
8	Effect of poly- $\alpha$ , $\gamma$ , L-glutamic acid as a capping agent on morphology and oxidative stress-dependent toxicity of silver nanoparticles. <i>International Journal of Nanomedicine</i> , 2011, 6, 2837.	3.3	34
9	Dye adsorption characteristics of magnetite nanoparticles coated with a biopolymer poly( $\gamma$ -glutamic acid). <i>Journal of Agricultural and Food Chemistry</i> , 2011, 59, 113-118.	4.8	113
10	The synthesis and characterization of poly( $\gamma$ -glutamic acid)-coated magnetite nanoparticles and their effects on antibacterial activity and cytotoxicity. <i>Nanotechnology</i> , 2011, 22, 075101.	1.3	48
11	Effect of alum treatment on the mechanical and antibacterial properties of poly( $\gamma$ -glutamic acid) nanofibers. <i>Textile Research Journal</i> , 2012, 82, 1211-1219.	1.1	6
12	In vitro removal of toxic heavy metals by poly( $\gamma$ -glutamic acid)-coated superparamagnetic nanoparticles. <i>International Journal of Nanomedicine</i> , 2012, 7, 4419.	3.3	37
13	Spore-forming bacteria and their utilisation as probiotics. <i>Beneficial Microbes</i> , 2012, 3, 67-75.	1.0	72
14	Physicochemical Properties of Roasted Soybean Flour Bioconverted by Solid-State Fermentation Using <i>Bacillus subtilis</i> and <i>Lactobacillus plantarum</i> . <i>Preventive Nutrition and Food Science</i> , 2012, 17, 36-45.	0.7	15
15	Mechanistic study of transfection of chitosan/DNA complexes coated by anionic poly( $\gamma$ -glutamic acid). <i>Biomaterials</i> , 2012, 33, 3306-3315.	5.7	63
16	Chitosan-based polyelectrolyte complex scaffolds with antibacterial properties for treating dental bone defects. <i>Materials Science and Engineering C</i> , 2012, 32, 207-214.	3.8	22
17	A Novel Biodegradable Green Poly(L-Aspartic Acid-Citric Acid) Copolymer for Antimicrobial Applications. <i>Journal of Polymers and the Environment</i> , 2012, 20, 17-22.	2.4	24
18	OPTIMIZATION PROCESS OF ROASTED BROKEN BLACK SOYBEAN NATTO USING RESPONSE SURFACE METHODOLOGY. <i>Journal of Food Processing and Preservation</i> , 2013, 37, 474-482.	0.9	3

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19	Production of Ultra-high Molecular Weight Poly- $\gamma$ -Glutamic Acid with <i>Bacillus licheniformis</i> P-104 and Characterization of its Flocculation Properties. <i>Applied Biochemistry and Biotechnology</i> , 2013, 170, 562-572.	1.4	48
20	Study on optimal conditions and adsorption kinetics of copper from water by collodion membrane cross-linked poly- $\gamma$ -glutamic acid. <i>Korean Journal of Chemical Engineering</i> , 2013, 30, 1295-1300.	1.2	1
21	Fabrication of Poly( $\gamma$ -glutamic acid)-coated Fe <sub>3</sub> O <sub>4</sub> Magnetic Nanoparticles and Their Application in Heavy Metal Removal. <i>Chinese Journal of Chemical Engineering</i> , 2013, 21, 1244-1250.	1.7	37
22	Effect of poly( $\gamma$ -glutamic acid) on microbial community and nitrogen pools of soil. <i>Acta Agriculturae Scandinavica - Section B Soil and Plant Science</i> , 2013, 63, 657-668.	0.3	11
23	Bioactivity in silica/poly( $\gamma$ -glutamic acid) sol-gel hybrids through calcium chelation. <i>Acta Biomaterialia</i> , 2013, 9, 7662-7671.	4.1	58
24	Analysis of calcium-induced effects on the conformation of fengycin. <i>Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy</i> , 2013, 110, 450-457.	2.0	12
25	Dye Adsorbent Prepared by Crosslinking of Poly( $\gamma$ -glutamic acid) and Gelatin. <i>Advanced Materials Research</i> , 2014, 989-994, 809-813.	0.3	0
26	Synthesis of Gelatin- $\gamma$ -Polyglutamic Acid-Based Hydrogel for the In Vitro Controlled Release of Epigallocatechin Gallate (EGCG) from <i>Camellia sinensis</i> . <i>Polymers</i> , 2014, 6, 39-58.	2.0	42
27	Novel bioconversion of sodium glutamate to $\gamma$ -poly-glutamic acid and $\gamma$ -amino butyric acid in a mixed fermentation using <i>Bacillus subtilis</i> HA and <i>Lactobacillus plantarum</i> K154. <i>Food Science and Biotechnology</i> , 2014, 23, 1551-1559.	1.2	9
28	Poly( $\gamma$ -glutamic acid)-silica hybrids with fibrous structure: effect of cation and silica concentration on molecular structure, degradation rate and tensile properties. <i>RSC Advances</i> , 2014, 4, 52491-52499.	1.7	13
29	Synthesis of poly( $\epsilon$ -caprolactone) nanospheres in the presence of the protective agent poly( $\gamma$ -glutamic acid). <i>Colloids and Surfaces B: Biointerfaces</i> , 2014, 117, 414-424.	2.5	11
30	Reducing Impurities in Fermentation Broth for $\gamma$ -Polyglutamic Acid Production by Medium Optimization Using <i>Bacillus licheniformis</i> CGMCC 3336. <i>Lecture Notes in Electrical Engineering</i> , 2014, , 291-303.	0.3	2
31	Metabolic studies of temperature control strategy on poly( $\gamma$ -glutamic acid) production in a thermophilic strain <i>Bacillus subtilis</i> GXA-28. <i>Bioresource Technology</i> , 2014, 155, 104-110.	4.8	34
32	Poly( $\gamma$ -glutamic acid)/Silica Hybrids with Calcium Incorporated in the Silica Network by Use of a Calcium Alkoxide Precursor. <i>Chemistry - A European Journal</i> , 2014, 20, 8149-8160.	1.7	47
33	In Vitro Adsorption of Aluminum by an Edible Biopolymer Poly( $\gamma$ -glutamic acid). <i>Journal of Agricultural and Food Chemistry</i> , 2014, 62, 4803-4811.	2.4	16
34	Physico-chemical and rheological characterization of poly- $\gamma$ -glutamic acid produced by a new strain of <i>Bacillus subtilis</i> . <i>European Polymer Journal</i> , 2014, 57, 91-98.	2.6	13
35	ToF-SIMS evaluation of calcium-containing silica- $\gamma$ -PGA hybrid systems for bone regeneration. <i>Applied Surface Science</i> , 2014, 309, 231-239.	3.1	7
36	Scale Control. , 2014, , 51-110.		0

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38	Texture modification of soy-based products. , 2015, , 237-255.		4
39	Infection-mimicking poly( $\hat{I}^3$ -glutamic acid) as adjuvant material for effective anti-tumor immune response. <i>International Journal of Biological Macromolecules</i> , 2015, 75, 495-504.	3.6	17
40	Adsorption of $La^{3+}$ and $Ce^{3+}$ by poly- $\hat{I}^3$ -glutamic acid crosslinked with polyvinyl alcohol. <i>Journal of Rare Earths</i> , 2015, 33, 884-891.	2.5	44
41	Poly- $\hat{I}^3$ -glutamic acid microneedles with a supporting structure design as a potential tool for transdermal delivery of insulin. <i>Acta Biomaterialia</i> , 2015, 24, 106-116.	4.1	111
42	Improving survival of probiotic bacteria using bacterial poly- $\hat{I}^3$ -glutamic acid. <i>International Journal of Food Microbiology</i> , 2015, 196, 24-31.	2.1	31
43	Poly- $\hat{I}^3$ -glutamic acid: production, properties and applications. <i>Microbiology (United Kingdom)</i> , 2015, 161, 1-17.	0.7	283
44	Poly- $\hat{I}^3$ -Glutamic Acid: Biodegradable Polymer for Potential Protection of Beneficial Viruses. <i>Materials</i> , 2016, 9, 28.	1.3	23
45	Simultaneous Biosynthesis of Polyhydroxyalkanoates and Extracellular Polymeric Substance (EPS) from Crude Glycerol from Biodiesel Production by Different Bacterial Strains. <i>Applied Biochemistry and Biotechnology</i> , 2016, 180, 1110-1127.	1.4	22
46	Microbial synthesis of poly- $\hat{I}^3$ -glutamic acid: current progress, challenges, and future perspectives. <i>Biotechnology for Biofuels</i> , 2016, 9, 134.	6.2	186
47	A review on progress of heavy metal removal using biosorbents of poly- $\hat{I}^3$ -glutamic acid. , 2016, , .		0
48	Cryoprotection of probiotic bacteria with poly- $\hat{I}^3$ -glutamic acid produced by <i>Bacillus subtilis</i> and <i>Bacillus licheniformis</i> . <i>Journal of Genetic Engineering and Biotechnology</i> , 2016, 14, 269-279.	1.5	9
49	Microstructured chitosan/poly( $\hat{I}^3$ -glutamic acid) polyelectrolyte complex hydrogels by computer-aided wet-spinning for biomedical three-dimensional scaffolds. <i>Journal of Bioactive and Compatible Polymers</i> , 2016, 31, 531-549.	0.8	56
50	Fabrication and in vitro characterization of electrospun poly ( $\hat{I}^3$ -glutamic acid)-silica hybrid scaffolds for bone regeneration. <i>Polymer</i> , 2016, 91, 106-117.	1.8	28
51	Adsorption capacities of poly- $\hat{I}^3$ -glutamic acid and its sodium salt for cesium removal from radioactive wastewaters. <i>Journal of Environmental Radioactivity</i> , 2016, 165, 151-158.	0.9	38
52	Physicochemical characterization and evaluation of PGA bioflocculant in coagulation-flocculation and sedimentation processes. <i>Journal of Environmental Chemical Engineering</i> , 2016, 4, 3753-3760.	3.3	18
53	Poly- $\hat{I}^3$ -glutamic acid-based GGT-targeting and surface camouflage strategy for improving cervical cancer gene therapy. <i>Journal of Materials Chemistry B</i> , 2017, 5, 1315-1327.	2.9	23
54	Effects of poly- $\hat{I}^3$ -glutamic acid ( $\hat{I}^3$ -PGA) on soil nitrogen and carbon leaching and CO <sub>2</sub> fluxes in a sandy clay loam soil. <i>Canadian Journal of Soil Science</i> , 0, , .	0.5	5

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55	Feasible protein aggregation of phosphorylated poly- $\gamma$ -glutamic acid derivative from <i>Bacillus subtilis</i> ( ) Tj ETQq0 0 Q,rgBT /Overlock 10 T	3.6	1
56	Modification of calcium phosphate cement with poly ( $\gamma$ -glutamic acid) and its strontium salt for kyphoplasty application. <i>Materials Science and Engineering C</i> , 2017, 80, 352-361.	3.8	21
57	Effects of poly- $\gamma$ -glutamic acid ( $\gamma$ -PGA) on plant growth and its distribution in a controlled plant-soil system. <i>Scientific Reports</i> , 2017, 7, 6090.	1.6	41
58	Effects of nanosized zinc oxide and $\gamma$ -polyglutamic acid on eggshell quality and serum parameters of aged laying hens. <i>Archives of Animal Nutrition</i> , 2017, 71, 373-383.	0.9	19
59	Mucilage extracted from wasted natto (fermented soybeans) as a low-cost poly- $\gamma$ -glutamic acid based biosorbent: Removal of rare-earth metal Nd from aqueous solutions. <i>Journal of Environmental Chemical Engineering</i> , 2017, 5, 6061-6069.	3.3	14
60	Biosynthesis and physicochemical characterization of a bacterial polysaccharide/polyamide blend, applied for microfluidics study in porous media. <i>International Journal of Biological Macromolecules</i> , 2017, 96, 100-110.	3.6	9
61	Preparation of Chitosan/Poly- $\gamma$ -Glutamic Acid Polyelectrolyte Multilayers on Biomedical Metals for Local Antibiotic Delivery. <i>Metals</i> , 2017, 7, 418.	1.0	5
62	Investigation of poly( $\gamma$ -glutamic acid) production via online determination of viscosity and oxygen transfer rate in shake flasks. <i>Journal of Biological Engineering</i> , 2017, 11, 23.	2.0	12
63	Production of poly- $\gamma$ -glutamic acid by a thermotolerant glutamate-independent strain and comparative analysis of the glutamate dependent difference. <i>AMB Express</i> , 2017, 7, 213.	1.4	16
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65	Using poly-glutamic acid as soil-washing agent to remediate heavy metal-contaminated soils. <i>Environmental Science and Pollution Research</i> , 2018, 25, 5231-5242.	2.7	39
66	Physicochemical properties, production, and biological functionality of poly- $\gamma$ -d-glutamic acid with constant molecular weight from halotolerant <i>Bacillus</i> sp. SJ-10. <i>International Journal of Biological Macromolecules</i> , 2018, 108, 598-607.	3.6	25
67	Fabrication of strontium/calcium containing poly( $\gamma$ -glutamic acid) " organosiloxane fibrous hybrid materials for osteoporotic bone regeneration. <i>RSC Advances</i> , 2018, 8, 25745-25753.	1.7	6
68	Preparation of new biosorbents based on poly- $\gamma$ -glutamic acid and its adsorption of heavy metal ions. <i>IOP Conference Series: Earth and Environmental Science</i> , 0, 191, 012061.	0.2	3
69	The effects of ploy ( $\gamma$ -glutamic acid) on spinach productivity and nitrogen use efficiency in North-West China. <i>Plant, Soil and Environment</i> , 2018, 64, 517-522.	1.0	17
70	Poly- $\gamma$ -glutamic acid improves the drought resistance of maize seedlings by adjusting the soil moisture and microbial community structure. <i>Applied Soil Ecology</i> , 2018, 129, 128-135.	2.1	47
71	Poly- $\gamma$ -glutamic acid, a bio-chelator, alleviates the toxicity of Cd and Pb in the soil and promotes the establishment of healthy <i>Cucumis sativus</i> L. seedling. <i>Environmental Science and Pollution Research</i> , 2018, 25, 19975-19988.	2.7	36
72	Effectiveness of poly- $\gamma$ -glutamic acid in maintaining enamel integrity. <i>Archives of Oral Biology</i> , 2019, 106, 104482.	0.8	8

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73	Morphological transformation of calcium phenylphosphonate microspheres induced by micellization of $\hat{I}^3$ -polyglutamic acid. <i>Journal of Colloid and Interface Science</i> , 2019, 556, 33-46.	5.0	2
74	Determination of gallic acid using poly(glutamic acid): graphene modified electrode. <i>Journal of Chemical Sciences</i> , 2019, 131, 1.	0.7	37
75	Viability of <i>Lactobacillus plantarum</i> encapsulated with poly- $\hat{I}^3$ -glutamic acid produced by <i>Bacillus</i> sp. SJ-10 during freeze-drying and in an in vitro gastrointestinal model. <i>LWT - Food Science and Technology</i> , 2019, 112, 108222.	2.5	16
76	Properties of Poly- $\hat{I}^3$ -Glutamic Acid Producing- <i>Bacillus</i> Species Isolated From Ogi Liquor and Lemon-Ogi Liquor. <i>Frontiers in Microbiology</i> , 2019, 10, 771.	1.5	21
77	Improvement of soybean cultivars for natto production through the selection of seed morphological and physiological characteristics and seed compositions: A review. <i>Plant Breeding</i> , 2019, 138, 131-139.	1.0	12
78	Optimized production of gamma poly glutamic acid ( $\hat{I}^3$ -PGA) using sago. <i>Biocatalysis and Agricultural Biotechnology</i> , 2019, 22, 101413.	1.5	20
79	Preparation, characterization, and antimicrobial activity of poly( $\hat{I}^3$ -glutamic acid)/chitosan blends. <i>Polymer Bulletin</i> , 2019, 76, 2163-2178.	1.7	11
80	A field pilot-scale study on heavy metal-contaminated soil washing by using an environmentally friendly agent "poly- $\hat{I}^3$ -glutamic acid ( $\hat{I}^3$ -PGA). <i>Environmental Science and Pollution Research</i> , 2020, 27, 34760-34769.	2.7	21
81	Optimized production of poly ( $\hat{I}^3$ -glutamic acid) ( $\hat{I}^3$ -PGA) using <i>Bacillus licheniformis</i> and its application as cryoprotectant for probiotics. <i>Biotechnology and Applied Biochemistry</i> , 2020, 67, 892-902.	1.4	19
82	Chelate chemistry governs ion-specific stiffening of <i>Bacillus subtilis</i> B-1 and <i>Azotobacter vinelandii</i> biofilms. <i>Biomaterials Science</i> , 2020, 8, 1923-1933.	2.6	6
83	Chelation of zinc(II) with poly( $\hat{I}^3$ -glutamic acid) in aqueous solution: kinetics, binding constant, and its antimicrobial activity. <i>Polymer Bulletin</i> , 2021, 78, 1353-1377.	1.7	7
84	Mitigation of soil salinization and alkalization by bacterium-induced inhibition of evaporation and salt crystallization. <i>Science of the Total Environment</i> , 2021, 755, 142511.	3.9	29
85	Poly- $\hat{I}^3$ -glutamic acid improves water-stable aggregates, nitrogen and phosphorus uptake efficiency, water-fertilizer productivity, and economic benefit in barren desertified soils of Northwest China. <i>Agricultural Water Management</i> , 2021, 245, 106551.	2.4	32
86	Improving enzyme activity, thermostability and storage stability of $\hat{I}^2$ -1,3-1,4-glucanase with poly- $\hat{I}^3$ -glutamic acid produced by <i>Bacillus</i> sp. SJ-10. <i>Enzyme and Microbial Technology</i> , 2021, 143, 109703.	1.6	9
87	$\hat{I}^3$ -PGA-Rich Chungkookjang, Short-Term Fermented Soybeans: Prevents Memory Impairment by Modulating Brain Insulin Sensitivity, Neuro-Inflammation, and the Gut "Microbiome" "Brain Axis. <i>Foods</i> , 2021, 10, 221.	1.9	27
88	Poly(glutamic acid): Production, composites, and medical applications of the next-generation biopolymer. <i>Progress in Polymer Science</i> , 2021, 113, 101341.	11.8	66
89	Drug delivery applications of poly- $\hat{I}^3$ -glutamic acid. <i>Future Journal of Pharmaceutical Sciences</i> , 2021, 7, .	1.1	9
90	On the Role of Poly-Glutamic Acid in the Early Stages of Iron(III) (Oxy)(hydr)oxide Formation. <i>Minerals (Basel, Switzerland)</i> , 2021, 11, 715.	0.8	2

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91	Optimization of fermentation conditions, purification and rheological properties of poly ( $\hat{\text{I}}^3$ -glutamic) Tj ETQq0 0 0 rgBT /Overlock 10 Tf 302-310.	1.0	2
92	Controlled Release of Chlorogenic Acid from Polyvinyl Alcohol/Poly( $\hat{\text{I}}^3$ -Glutamic Acid) Blended Electrospun Nanofiber Mats with Potential Applications in Diabetic Foot Treatment. <i>Polymers</i> , 2021, 13, 2943.	2.0	3
93	Glycerol-modified $\hat{\text{I}}^3$ -PGA and gellan composite hydrogel materials with tunable physicochemical and thermal properties for soft tissue engineering application. <i>Polymer</i> , 2021, 230, 124049.	1.8	13
94	Phytoremediation of secondary saline soil by halophytes with the enhancement of $\hat{\text{I}}^3$ -polyglutamic acid. <i>Chemosphere</i> , 2021, 285, 131450.	4.2	22
95	Production and applications of polyglutamic acid. , 2021, , 253-282.		0
96	Coherent Aspects of Multifaceted Eco-friendly Biopolymer - Polyglutamic Acid from the Microbes. <i>Journal of Pure and Applied Microbiology</i> , 2019, 13, 741-756.	0.3	3
97	Biosynthesis of $\hat{\text{I}}^3$ -Polyglutamic Acid by <i>Bacillus licheniformis</i> Through Submerged Fermentation (SmF) and Solid-state Fermentation (SSF). <i>Chemical and Biochemical Engineering Quarterly</i> , 2021, , .	0.5	0
98	Effects of nanoparticle chromium mixed with $\hat{\text{I}}^3$ -polyglutamic acid on the chromium bioavailability, growth performance, serum parameters and carcass traits of pigs. <i>Animal Production Science</i> , 2019, 59, 2222.	0.6	0
99	Recent Advances in Microbial Synthesis of Poly- $\hat{\text{I}}^3$ -Glutamic Acid: A Review. <i>Foods</i> , 2022, 11, 739.	1.9	18
100	Preparation of the Chitosan/Poly- $\hat{\text{I}}^3$ -Glutamic Acid/Glabrid in Hybrid Nanoparticles and Study on its Releasing Property. <i>Current Drug Delivery</i> , 2023, 20, 1195-1205.	0.8	1
101	Preparation of gamma poly-glutamic acid/hydroxyapatite/collagen composite as the 3D-printing scaffold for bone tissue engineering. <i>Biomaterials Research</i> , 2022, 26, .	3.2	5
102	Microbial Poly- $\hat{\text{I}}^3$ -Glutamic Acid ( $\hat{\text{I}}^3$ -PGA) as an Effective Tooth Enamel Protectant. <i>Polymers</i> , 2022, 14, 2937.	2.0	6
103	Building a circular economy around poly(D/L- $\hat{\text{I}}^3$ -glutamic acid)- a smart microbial biopolymer. <i>Biotechnology Advances</i> , 2022, 61, 108049.	6.0	8
104	Removal of humic acid interference in soil enzymatic analysis using poly- $\hat{\text{I}}^3$ -glutamic acid. <i>Analytical Sciences</i> , 0, , .	0.8	0
105	Citric Acid and Poly-glutamic Acid Promote the Phytoextraction of Cadmium and Lead in <i>Solanum nigrum</i> L. Grown in Compound Cdâ€Pb Contaminated Soils. <i>Bulletin of Environmental Contamination and Toxicology</i> , 2023, 110, .	1.3	2
106	Implication of organic solvents in the precipitation of $\hat{\text{I}}^3$ -polyglutamic acid for application as a sustainable flocculating agent. <i>Biocatalysis and Agricultural Biotechnology</i> , 2023, 50, 102698.	1.5	1
107	Synergistic Impact of <i>Lactobacillus plantarum</i> and <i>Bacillus coagulans</i> on Solid-State Fermentation of <i>Astragalus</i> and Effects of Fermentation Products on Disease Resistance of Crucian Carp ( <i>Carassius</i> ) Tj ETQq0 0 0 rgBT /Overlock 10 Tf 5	0.5	2