

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1.	Essential amino acid content of various cereals and legumes.	3
2.	Protein quality of various legumes.	5
3.	Essential amino acid composition of cereal-legume combinations.	6
4.	Nutrient content of cereal-legume combination.	7
5.	Relative efficiency of vegetable foods and animal foods as suppliers of nutrients.	9
6.	Antinutritional factors and toxins in cereals and legumes.	10
7.	Distribution of flatulence producing oligosaccharides in seeds of various legumes and cereals.	21
8.	Naturally occurring toxic amino acids and derivatives in leguminosae.	31
9.	The four stages of neurolathyrism.	33
10.	Different toxic factors present in <u>Lathyrus sativus</u> .	36
11.	Effect of ODAP administration into different animals.	41
12.	Mechanisms of ODAP toxicity.	45
13.	Proximate principles, minerals and vitamins of <u>L. sativus</u> compared to common legumes.	52
14.	Amino acid composition of <u>L. sativus</u> seed meal and protein concentrate.	53
15.	Antinutritional factors and toxins present in <u>L. sativus</u> seeds.	55
16.	Effect of different food processing on neurotoxin content of <u>L. sativus</u> .	56
17.	Effect of processing on the nutritive values of cereals and legumes.	61
18.	Ingredients used and microorganisms involved in legume based fermented foods.	64

contd..

List of Tables (Contd..)

<u>Table No.</u>		<u>Page No.</u>
19.	Chemical changes during fermentation of Indian fermented foods.	71
20.	Effect of fermentation on some antinutritional compounds and toxins of cereals and legumes.	73
21.	Ability of various microorganisms to bring about changes observed during fermentation.	78
22.	Microorganisms producing α -galactosidase.	83
23.	Molecular forms and properties of some plant α -galactosidases.	90
24.	Molecular forms and properties of some plant invertases.	93
25.	Properties of some conjugative and non-conjugative plasmids.	103
26.	Phenotype traits exhibited by plasmid-carried genes.	105
27.	Degradative plasmids in bacteria.	106
28.	Properties of some natural plasmids used for cloning DNA.	113
29.	Foreign proteins produced in microorganisms.	114
30.	Microorganisms identified in Indian fermented foods.	119
31.	Bacterial flora of fermented batters.	121
32.	Microbial population of ingredients used for preparation of Indian fermented foods.	123
33a.	List of chemicals used for experiments.	129
33b.	List of reagents and standards used for experiments.	132
34.	Composition of APT agar.	138
35.	Composition of potato Dextrose agar.	139
36.	Composition of GYE agar.	140
37.	Composition of the medium for maintenance of lactic cultures.	140
38.	Composition of raffinose broth.	142
39.	Composition of ODAP broth.	144

contd..

List of Tables (Contd..)

<u>Table No.</u>		<u>Page No.</u>
40.	Composition of MRS agar.	146
41.	Differential medium for lactic <u>streptococci</u> .	147
42.	Composition of Sodium azide agar.	148
43.	Composition of the medium for indole production.	149
44.	Composition of medium for carbohydrate ferment- ation.	150
45.	Composition of medium for aesculin hydrolysis.	151
46.	Composition of medium for citrate utilization test.	152
47.	Tests for catalase and oxidase detection.	153
48.	Composition of medium for litmus milk test.	154
49.	Composition of the medium for nitrate reduction test.	155
50.	Composition of Gelatin medium.	156
51.	Composition of the medium for 'MR' and 'VP' test.	157
52.	Composition of the medium for H ₂ S production.	158
53.	Composition of the medium for phenylalanine deaminase test.	159
54.	Composition of the medium for urease test.	160
55.	Composition of the medium for Arginine hydrolysis.	161
56.	Composition of the medium for malonate utilization test.	162
57.	Composition of Thioglycollate medium.	163
58.	Composition of Gibson's semisolid medium.	164
59.	Starch agar medium composition.	165
60.	Composition of 'LB' medium.	165
61.	Composition of 'DAPA' broth.	166
62.	Composition of oxalate broth.	167

contd..

List of Tables (Contd..)

<u>Table No.</u>		<u>Page No.</u>
63.	Details of assay system for α -galactosidase and invertase.	187
64.	Details of assay system for ODAP hydrolysing enzymes.	205
65.	List of reagents used for Genetics experiments.	206
66.	Composition of M9 medium.	213
67.	Composition of medium for cultivation of <u>E. coli</u> K12-C600.	214
68.	Injection protocol for immunization of animals, against α -galactosidase from <u>Bacillus sp. I.</u>	237
69.	Bleeding schedule for immunization of animals against α -galactosidase from <u>Bacillus sp. I.</u>	238
70.	Characteristics of a fermented product from <u>L. sativus</u> dhal.	242
71.	Changes in bacterial counts during soaking and fermentation of <u>L. sativus</u> dhal.	244
72.	Characteristics of bacterial isolates from fermented <u>L. sativus</u> dhal.	245
73.	Changes in bacterial population of <u>L. sativus</u> dhal batter during fermentation.	249
74.	Characteristics of bacterial isolates from stored grains.	254
75.	Recovery of sugars by TLC method.	264
76.	Distribution of oligosaccharides and simple sugars in seeds of <u>L. sativus</u> , <u>Glycine max</u> and <u>Cicer arietinum</u> analysed by T.L.C. method.	267
77.	Distribution of oligosaccharides and simple sugars in unfermented and fermented <u>L. sativus</u> dhal analysed by TLC.	268
78.	Detector response of TMS derivatives of sugars on UCW-98 column in GC.	271
79.	Distribution of oligosaccharides and simple sugars in processed food samples of <u>L. sativus</u> dhal.	275
80.	Distribution of oligosaccharides and simple sugars in processed food samples of <u>L. sativus</u> seeds.	278

contd..

List of Tables (Contd..)

<u>Table No.</u>		<u>Page No.</u>
81.	Percentage loss or gain in the content of oligo-saccharides and simple sugars during processing of <u>L. sativus</u> dhal/seeds.	279
82.	Capacity of various bacterial isolates to degrade raffinose.	286
83.	Growth of <u>Bacillus</u> sp. I in raffinose broth and degradation of raffinose.	291
84.	Growth of <u>Bacillus</u> sp. I in stachyose broth and degradation of stachyose.	292
85.	Growth of <u>Bacillus</u> sp. I in melibiose broth and degradation of melibiose.	293
86.	Growth of <u>Bacillus</u> sp. I in sucrose broth and degradation of sucrose.	294
87.	Detection of raffinose hydrolysing enzymes in the cell free extract of <u>Bacillus</u> sp. I.	301
88.	Optimum conditions for the activities of α -galactosidase and invertase of <u>Bacillus</u> sp. I.	303
89.	Effect of mercaptoethanol on the stability of raffinose hydrolysing enzymes of <u>Bacillus</u> sp. I.	309
90.	Effect of initial pH of the medium on growth and production of raffinose hydrolysing enzymes of <u>Bacillus</u> sp. I.	311
91.	Effect of inoculum size on growth and production of raffinose hydrolysing enzymes of <u>Bacillus</u> sp. I.	312
92.	Effect of period of incubation on growth and production of raffinose hydrolysing enzymes of <u>Bacillus</u> sp. I.	313
93.	Effect of raffinose concentration in the medium on growth and production of raffinose degrading enzymes of <u>Bacillus</u> sp. I.	314
94.	Effect of aeration on growth and production of raffinose hydrolysing enzymes of <u>Bacillus</u> sp. I.	315
95.	Effect of different concentrations of glucose on growth and production of raffinose hydrolysing enzymes of <u>Bacillus</u> sp. I.	317
96.	Effect of different sugars on growth and production of raffinose hydrolysing enzymes of <u>Bacillus</u> sp. I.	318

contd..

List of Tables (Contd..)

<u>Table No.</u>		<u>Page No.</u>
97.	Effect of different nitrogen sources on growth and production of raffinose hydrolysing enzymes of <u>Bacillus sp. I.</u>	319
98.	Effect of different vitamins on growth and production of raffinose hydrolysing enzymes of <u>Bacillus sp. I.</u>	321
99.	Effect of different amino acids on growth and production of raffinose hydrolysing enzymes of <u>Bacillus sp. I.</u>	322
100.	Purification of α -galactosidase from the cell free extract of <u>Bacillus sp. I.</u>	346
101.	Purification of invertase from the cell free extract of <u>Bacillus sp. I.</u>	347
102.	Effect of various sugars on α -galactosidase activity of <u>Bacillus sp. I.</u>	372
103.	Substrate specificity of α -galactosidase from <u>Bacillus sp. I.</u>	378
104.	Km and Vmax values of α -galactosidase from various sources.	380
105.	Effect of various inhibitors on catalytic activity of purified α -galactosidase from <u>Bacillus sp. I.</u>	383
106.	Effect of various inhibitors on the catalytic activity of purified invertase from <u>Bacillus sp. I.</u>	387
107.	Comparison of characteristics of invertase from various sources.	393
108.	Comparison of characteristics of α -galactosidases from various sources.	400
109.	Recovery of radioactivity during conversion of ^{14}C -oxalic acid into ^{14}C -dimethyl oxalate.	405
110.	Recovery of radioactivity during conversion of ^{14}C -dimethyl oxalate into oxalyl labelled ODAP.	406
111.	Characteristics of ODAP prepared by different methods.	409
112.	Effect of intraperitoneal injection of ODAP on rats.	410
113.	Capacity of various bacterial isolates to breakdown synthetic ODAP.	413
114.	Capacity of various isolates to breakdown ODAP from seeds.	414

contd..

List of Tables (Contd..)

<u>Table No.</u>		<u>Page No.</u>
115.	Changes in physical characteristics and neurotoxin (ODAP) content in <u>L. sativus</u> batter during natural and experimental fermentations of <u>L. sativus</u> dhal with pure cultures.	421
116.	Detection of ODAP hydrolysing enzyme system in bacterial isolates.	425
117.	Measurement of ODAP hydrolase activity of <u>Streptococcus sp. I</u> in terms of oxalate liberated.	427
118.	Analysis of products formed when cell free extract of <u>Streptococcus sp. I</u> incubated with ODAP as substrate.	430
119.	Optimum conditions for the activity of ODAP hydrolysing enzymes of <u>Streptococcus sp. I</u> .	437
120.	Effect of dialysis and pyridoxal phosphate ^{requirement} on ODAP hydrolysing enzymes of <u>Streptococcus sp. I</u> .	440
121.	Effect of compounds which bind carbonyl groups or metal ions on ODAP hydrolysing enzymes of <u>Streptococcus sp. I</u> .	441
122.	Effect of sulphhydryl binding reagents on catalytic activity of ODAP hydrolysing enzymes of <u>Streptococcus sp. I</u> .	443
123.	Effect of some organic and inorganic compounds on catalytic activity of ODAP hydrolysing enzymes of <u>Streptococcus sp. I</u> .	444
124.	Comparison of characteristics of hydrolases from various sources.	447
125.	Comparison of properties of PEP dependent lyases from various sources.	452
126.	Effect of initial pH on growth, degradation of ODAP and production of ODAP hydrolysing enzymes of <u>Streptococcus sp. I</u> .	454
127.	Effect of inoculum size on growth and degradation of ODAP and production of ODAP hydrolysing enzymes by <u>Streptococcus sp. I</u> .	456
128.	Effect of concentration of ODAP in the medium on growth and production of ODAP hydrolysing enzymes by <u>Streptococcus sp. I</u> .	457

contd..

List of Tables-(Contd..)

<u>Table No.</u>		<u>Page No.</u>
129.	Effect of aeration on growth, degradation of ODAP and production of ODAP hydrolysing enzymes by <u>Streptococcus sp. I.</u>	458
130.	Effect of different concentration of glucose on growth, degradation of ODAP and production of ODAP hydrolysing enzymes by <u>Streptococcus sp. I.</u>	461
131.	Effect of different sugars on growth, ODAP degradation and ODAP hydrolysing enzymes by <u>Streptococcus sp. I.</u>	462
132.	Effect of different vitamins on growth, ODAP degradation and production of ODAP hydrolysing enzymes by <u>Streptococcus sp. I.</u>	463
133.	Effect of different amino acids on growth, degradation and production of ODAP hydrolysing enzymes by <u>Streptococcus sp. I.</u>	464
134.	Effect of other toxic/antinutritional factors of <u>L. sativus</u> on growth, ODAP degradation and production of ODAP hydrolysing enzymes by <u>Streptococcus sp. I.</u>	466
135.	Production of ODAP hydrolysing enzymes during growth of <u>Streptococcus sp. I</u> in presence of different carbon sources.	468
136.	Plasmids encoding degradation of some halogenated compounds.	476
137.	List of some <u>Streptococcal</u> plasmids.	477
138.	<u>Bacillus</u> plasmids developed as cloning vehicles.	480
139.	MIC of different curing agents tried for <u>Streptococcus sp. I.</u>	483
140.	Frequency of loss of neurotoxin degrading ability of <u>Streptococcus sp. I</u> by different curing agents.	483
141.	MIC of different curing agents tried for the growth of <u>Bacillus sp. I.</u>	486
142.	Frequency of loss of raffinose degrading ability of <u>Bacillus sp. I</u> by curing agents.	487
143.	Viability of cells (<u>Bacillus sp. I</u>) at elevated temperature during their growth with acetylcholine.	488

contd..

List of Tables (Contd...)

<u>Table</u> <u>No.</u>		<u>Page</u> <u>No.</u>
144.	α -Galactosidase activity of crude extract from cured and parental strains of <u>Bacillus sp. I</u> grown on different substrates.	490
145.	Comparison of melibiose induced and raffinose induced α -galactosidase of <u>Bacillus sp. I</u> .	498
146.	Comparison of α -galactosidases coded by 'Raf' plasmid B1021 and by <u>E. coli K12</u> .	503
