

LIST OF FIGURES

Fig. No.	Description	Page No.
2.4.1	Flow chart of three step pesticide detoxification system (Cherian and Oliveira 2005; Coleman <i>et al.</i> 1997). Phase 1 enzymes = P450 monooxygenase, peroxidase and carboxylesterase, GST = glutathione-s-transferase, UGT = UDP-glycosyltransferase and GSH = glutathione.	40
2.5.1	Overview of plant response to pesticide stress and exogenous BRs application.	45
3.10.1	Artificial neural networks (ANN) model with IMI, EBR and DAS as inputs. (IMI= applied imidacloprid, EBR= applied 24-epibrassinolide, DAS=days after sowing, n=neuron).	74
4.1.1	Effect of seed soaking with EBR on length of <i>B. juncea</i> seedlings grown under IMI toxicity.	76
4.1.2	Effect of seed soaking with EBR on biomass of <i>B. juncea</i> seedlings grown under IMI toxicity.	76
4.2.1	Effect of seed soaking with EBR on shoot length of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	78
4.2.2	Effect of seed soaking with EBR on shoot length of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	78
4.2.3	Effect of seed soaking with EBR on shoot length of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	79
4.2.4	Effect of seed soaking with EBR on number of leaves in <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	80
4.2.5	Effect of seed soaking with EBR on number of leaves in <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	81
4.2.6	Effect of seed soaking with EBR on number of leaves in <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	81
4.2.7	Effect of seed soaking with EBR on shoot biomass of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	83
4.2.8	Effect of seed soaking with EBR on shoot biomass of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	83
4.2.9	Effect of seed soaking with EBR on shoot biomass of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	84
5.1.1	Effect of seed soaking with EBR on total chlorophyll content in <i>B. juncea</i> seedlings grown under IMI toxicity.	86
5.1.2	Effect of seed soaking with EBR on total chlorophyll content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	88

Fig. No.	Description	Page No.
5.1.3	Effect of seed soaking with EBR on total chlorophyll content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	88
5.1.4	Effect of seed soaking with EBR on total chlorophyll content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	89
5.1.5	Correlation between target (experimental) and output (simulated) total chlorophyll contents using ANN model ($p < 0.001$).	89
5.1.6	Effect of seed soaking with EBR on carotenoid content in <i>B. juncea</i> seedlings grown under IMI toxicity.	90
5.1.7	Effect of seed soaking with EBR on carotenoid content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	91
5.1.8	Effect of seed soaking with EBR on carotenoid content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	92
5.1.9	Effect of seed soaking with EBR on carotenoid content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	92
5.1.10	Correlation between target (experimental) and output (simulated) carotenoid contents using ANN model ($p < 0.001$).	93
5.1.11	Effect of seed soaking with EBR on anthocyanin content in <i>B. juncea</i> seedlings grown under IMI toxicity.	94
5.1.12	Effect of seed soaking with EBR on anthocyanin content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	95
5.1.13	Effect of seed soaking with EBR on anthocyanin content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	96
5.1.14	Effect of seed soaking with EBR on anthocyanin content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	96
5.1.15	Correlation between target (experimental) and output (simulated) anthocyanin contents using ANN model ($p < 0.001$).	97
5.1.16	Effect of seed soaking with EBR on xanthophyll content in <i>B. juncea</i> seedlings grown under IMI toxicity.	98
5.1.17	Effect of seed soaking with EBR on xanthophyll content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	98
5.1.18	Effect of seed soaking with EBR on xanthophyll content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	99
5.1.19	Effect of seed soaking with EBR on xanthophyll content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	100
5.1.20	Correlation between target (experimental) and output (simulated) xanthophyll contents using ANN model ($p < 0.001$).	100

Fig. No.	Description	Page No.
5.2.1	Effect of seed soaking with EBR on net photosynthetic rate in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	102
5.2.2	Effect of seed soaking with EBR on net photosynthetic rate in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	102
5.2.3	Effect of seed soaking with EBR on net photosynthetic rate in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	103
5.2.4	Correlation between target (experimental) and output (simulated) net photosynthetic rates using ANN model (p<0.001).	103
5.2.5	Effect of seed soaking with EBR on stomatal conductance in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	105
5.2.6	Effect of seed soaking with EBR on stomatal conductance in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	105
5.2.7	Effect of seed soaking with EBR on stomatal conductance in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	106
5.2.8	Correlation between target (experimental) and output (simulated) stomatal conductance rates using ANN model (p<0.001).	106
5.2.9	Effect of seed soaking with EBR on inter-cellular CO ₂ in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	108
5.2.10	Effect of seed soaking with EBR on inter-cellular CO ₂ in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	108
5.2.11	Effect of seed soaking with EBR on inter-cellular CO ₂ in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	109
5.2.12	Correlation between target (experimental) and output (simulated) inter-cellular CO ₂ using ANN model (p<0.001).	109
5.2.13	Effect of seed soaking with EBR on transpiration rate in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	111
5.2.14	Effect of seed soaking with EBR on transpiration rate in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	111
5.2.15	Effect of seed soaking with EBR on transpiration rate in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	112
5.2.16	Correlation between target (experimental) and output (simulated) transpiration rates using ANN model (p<0.001).	112
6.1.1	Effect of seed soaking with EBR on superoxide anion content in <i>B. juncea</i> seedlings grown under IMI toxicity.	114
6.1.2	Effect of seed soaking with EBR on superoxide anion content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	115

Fig. No.	Description	Page No.
6.1.3	Effect of seed soaking with EBR on superoxide anion content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	115
6.1.4	Effect of seed soaking with EBR on superoxide anion content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	116
6.1.5	Correlation between target (experimental) and output (simulated) superoxide anion contents using ANN model (p<0.001).	116
6.1.6	Effect of seed soaking with EBR on hydrogen peroxide content in <i>B. juncea</i> seedlings grown under IMI toxicity.	118
6.1.7	Effect of seed soaking with EBR on hydrogen peroxide content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	119
6.1.8	Effect of seed soaking with EBR on hydrogen peroxide content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	119
6.1.9	Effect of seed soaking with EBR on hydrogen peroxide content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	120
6.1.10	Correlation between target (experimental) and output (simulated) hydrogen peroxide contents using ANN model (p<0.001).	120
6.1.11	Effect of seed soaking with EBR on malondialdehyde content in <i>B. juncea</i> seedlings grown under IMI toxicity.	121
6.1.12	Effect of seed soaking with EBR on malondialdehyde content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	122
6.1.13	Effect of seed soaking with EBR on malondialdehyde content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	123
6.1.14	Effect of seed soaking with EBR on malondialdehyde content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	123
6.1.15	Correlation between target (experimental) and output (simulated) malondialdehyde contents using ANN model (p<0.001).	124
6.2.1	Effect of seed soaking with EBR on SOD activity in <i>B. juncea</i> seedlings grown under IMI toxicity.	125
6.2.2	Effect of seed soaking with EBR on SOD activity in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	126
6.2.3	Effect of seed soaking with EBR on SOD activity in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	127
6.2.4	Effect of seed soaking with EBR on SOD activity in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	127
6.2.5	Correlation between target (experimental) and output (simulated) SOD activities using ANN model (p<0.001).	128

Fig. No.	Description	Page No.
6.2.6	Effect of seed soaking with EBR on CAT activity in <i>B. juncea</i> seedlings grown under IMI toxicity.	129
6.2.7	Effect of seed soaking with EBR on CAT activity in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	130
6.2.8	Effect of seed soaking with EBR on CAT activity in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	130
6.2.9	Effect of seed soaking with EBR on CAT activity in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	131
6.2.10	Correlation between target (experimental) and output (simulated) CAT activities using ANN model ($p < 0.001$).	131
6.2.11	Effect of seed soaking with EBR on APOX activity in <i>B. juncea</i> seedlings grown under IMI toxicity.	132
6.2.12	Effect of seed soaking with EBR on APOX activity in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	133
6.2.13	Effect of seed soaking with EBR on APOX activity in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	134
6.2.14	Effect of seed soaking with EBR on APOX activity in the green pods of <i>B. juncea</i> plants (80 DAS) grown under IMI toxicity.	134
6.2.15	Effect of seed soaking with EBR on APOX activity in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	135
6.2.16	Correlation between target (experimental) and output (simulated) APOX activities using ANN model ($p < 0.001$).	135
6.2.17	Effect of seed soaking with EBR on GPOX activity in <i>B. juncea</i> seedlings grown under IMI toxicity.	136
6.2.18	Effect of seed soaking with EBR on GPOX activity in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	137
6.2.19	Effect of seed soaking with EBR on GPOX activity in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	138
6.2.20	Effect of seed soaking with EBR on GPOX activity in the green pods of <i>B. juncea</i> plants (80 DAS) grown under IMI toxicity.	138
6.2.21	Effect of seed soaking with EBR on GPOX activity in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	139
6.2.22	Correlation between target (experimental) and output (simulated) GPOX activities using ANN model ($p < 0.001$).	139
6.2.23	Effect of seed soaking with EBR on POD activity in <i>B. juncea</i> seedlings grown under IMI toxicity.	140

Fig. No.	Description	Page No.
6.2.24	Effect of seed soaking with EBR on POD activity in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	141
6.2.25	Effect of seed soaking with EBR on POD activity in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	142
6.2.26	Effect of seed soaking with EBR on POD activity in the leaves of <i>B. juncea</i> plants (65 DAS) grown under IMI toxicity.	142
6.2.27	Effect of seed soaking with EBR on POD activity in the green pods of <i>B. juncea</i> plants (80 DAS) grown under IMI toxicity.	143
6.2.28	Effect of seed soaking with EBR on POD activity in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	143
6.2.29	Correlation between target (experimental) and output (simulated) POD activities using ANN model ($p < 0.001$).	144
6.2.30	Effect of seed soaking with EBR on DHAR activity in <i>B. juncea</i> seedlings grown under IMI toxicity.	145
6.2.31	Effect of seed soaking with EBR on DHAR activity in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	146
6.2.32	Effect of seed soaking with EBR on DHAR activity in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	146
6.2.33	Effect of seed soaking with EBR on DHAR activity in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	147
6.2.34	Correlation between target (experimental) and output (simulated) DHAR activities using ANN model ($p < 0.001$).	147
6.2.35	Effect of seed soaking with EBR on GR activity in <i>B. juncea</i> seedlings grown under IMI toxicity.	148
6.2.36	Effect of seed soaking with EBR on GR activity in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	149
6.2.37	Effect of seed soaking with EBR on GR activity in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	150
6.2.38	Effect of seed soaking with EBR on GR activity in the leaves of <i>B. juncea</i> plants (65 DAS) grown under IMI toxicity.	150
6.2.39	Effect of seed soaking with EBR on GR activity in the green pods of <i>B. juncea</i> plants (80 DAS) grown under IMI toxicity.	151
6.2.40	Effect of seed soaking with EBR on GR activity in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	151
6.2.41	Correlation between target (experimental) and output (simulated) GR activities using ANN model ($p < 0.001$).	152

Fig. No.	Description	Page No.
6.2.42	Effect of seed soaking with EBR on GST activity in <i>B. juncea</i> seedlings grown under IMI toxicity.	153
6.2.43	Effect of seed soaking with EBR on GST activity in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	154
6.2.44	Effect of seed soaking with EBR on GST activity in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	154
6.2.45	Effect of seed soaking with EBR on GST activity in the leaves of <i>B. juncea</i> plants (65 DAS) grown under IMI toxicity.	155
6.2.46	Effect of seed soaking with EBR on GST activity in the green pods of <i>B. juncea</i> plants (80 DAS) grown under IMI toxicity.	155
6.2.47	Effect of seed soaking with EBR on GST activity in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	156
6.2.48	Correlation between target (experimental) and output (simulated) GST activities using ANN model ($p < 0.001$).	156
6.3.1	Effect of seed soaking with EBR on ascorbate content in <i>B. juncea</i> seedlings grown under IMI toxicity.	157
6.3.2	Effect of seed soaking with EBR on ascorbate content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	158
6.3.3	Effect of seed soaking with EBR on ascorbate content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	159
6.3.4	Effect of seed soaking with EBR on ascorbate content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	159
6.3.5	Correlation between target (experimental) and output (simulated) ascorbate contents using ANN model ($p < 0.001$).	160
6.3.6	Effect of seed soaking with EBR on glutathione content in <i>B. juncea</i> seedlings grown under IMI toxicity.	161
6.3.7	Effect of seed soaking with EBR on glutathione content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	162
6.3.8	Effect of seed soaking with EBR on glutathione content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	162
6.3.9	Effect of seed soaking with EBR on glutathione content in the leaves of <i>B. juncea</i> plants (65 DAS) grown under IMI toxicity.	163
6.3.10	Effect of seed soaking with EBR on glutathione content in the green pods of <i>B. juncea</i> plants (80 DAS) grown under IMI toxicity.	163
6.3.11	Effect of seed soaking with EBR on glutathione content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	164
6.3.12	Correlation between target (experimental) and output (simulated) glutathione contents using ANN model ($p < 0.001$).	164

Fig. No.	Description	Page No.
6.3.13	Effect of seed soaking with EBR on tocopherol content in <i>B. juncea</i> seedlings grown under IMI toxicity.	165
6.3.14	Effect of seed soaking with EBR on tocopherol content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	166
6.3.15	Effect of seed soaking with EBR on tocopherol content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	167
6.3.16	Effect of seed soaking with EBR on tocopherol content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	167
6.2.17	Correlation between target (experimental) and output (simulated) tocopherol contents using ANN model ($p < 0.001$).	168
6.3.18	Effect of seed soaking with EBR on total phenol content in <i>B. juncea</i> seedlings grown under IMI toxicity.	169
6.3.19	Effect of seed soaking with EBR on total phenol content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	170
6.3.20	Effect of seed soaking with EBR on total phenol content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	170
6.3.21	Effect of seed soaking with EBR on total phenol content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	171
6.3.22	Correlation between target (experimental) and output (simulated) total phenol contents using ANN model ($p < 0.001$).	171
6.3.23	Effect of seed soaking with EBR on total polyphenol content in <i>B. juncea</i> seedlings grown under IMI toxicity.	172
6.3.24	Effect of seed soaking with EBR on total polyphenol content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	177
6.3.25	Effect of seed soaking with EBR on total polyphenol content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	177
6.3.26	Effect of seed soaking with EBR on total polyphenol content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	178
2.3.27	Correlation between target (experimental) and output (simulated) total phenol contents using ANN model ($p < 0.001$).	178
7.1.1	Effect of seed soaking with EBR on protein content in <i>B. juncea</i> seedlings grown under IMI toxicity.	180
7.1.2	Effect of seed soaking with EBR on protein content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	181
7.1.3	Effect of seed soaking with EBR on protein content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	182
7.1.4	Effect of seed soaking with EBR on protein content in the leaves of <i>B. juncea</i> plants (65 DAS) grown under IMI toxicity.	182

Fig. No.	Description	Page No.
7.1.5	Effect of seed soaking with EBR on protein content in the green pods of <i>B. juncea</i> plants (80 DAS) grown under IMI toxicity.	183
7.1.6	Effect of seed soaking with EBR on protein content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	183
7.1.7	Correlation between target (experimental) and output (simulated) protein contents using ANN model ($p < 0.001$).	184
7.2.1	Effect of seed soaking with EBR on total amino acid content in <i>B. juncea</i> seedlings grown under IMI toxicity.	185
7.2.2	Effect of seed soaking with EBR on total amino acid content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	187
7.2.3	Effect of seed soaking with EBR on total amino acid content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	188
7.2.4	Effect of seed soaking with EBR on total amino acid content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	190
7.2.5	Correlation between target (experimental) and output (simulated) total amino acid contents using ANN model ($p < 0.001$).	190
7.3.1	Effect of seed soaking with EBR on citrate content in <i>B. juncea</i> seedlings grown under IMI toxicity.	191
7.3.2	Effect of seed soaking with EBR on citrate content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	192
7.3.3	Effect of seed soaking with EBR on citrate content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	193
7.3.4	Effect of seed soaking with EBR on citrate content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	193
7.3.5	Correlation between target (experimental) and output (simulated) citrate contents using ANN model ($p < 0.001$).	194
7.3.6	Effect of seed soaking with EBR on succinate content in <i>B. juncea</i> seedlings grown under IMI toxicity.	195
7.3.7	Effect of seed soaking with EBR on succinate content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	196
7.3.8	Effect of seed soaking with EBR on succinate content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	197
7.3.9	Effect of seed soaking with EBR on succinate content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	197
7.3.10	Correlation between target (experimental) and output (simulated) succinate contents using ANN model ($p < 0.001$).	198
7.3.11	Effect of seed soaking with EBR on fumarate content in <i>B. juncea</i> seedlings grown under IMI toxicity.	199

Fig. No.	Description	Page No.
7.3.12	Effect of seed soaking with EBR on fumarate content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	200
7.3.13	Effect of seed soaking with EBR on fumarate content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	200
7.3.14	Effect of seed soaking with EBR on fumarate content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	201
7.3.15	Correlation between target (experimental) and output (simulated) fumarate contents using ANN model ($p < 0.001$).	201
7.3.16	Effect of seed soaking with EBR on malate content in <i>B. juncea</i> seedlings grown under IMI toxicity.	202
7.3.17	Effect of seed soaking with EBR on malate content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	203
7.3.18	Effect of seed soaking with EBR on malate content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	204
7.3.19	Effect of seed soaking with EBR on malate content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	204
7.3.20	Correlation between target (experimental) and output (simulated) malate contents using ANN model ($p < 0.001$).	205
8.1.1	Effect of seed soaking with EBR on carbon content in <i>B. juncea</i> seedlings grown under IMI toxicity.	207
8.1.2	Effect of seed soaking with EBR on carbon content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	208
8.1.3	Effect of seed soaking with EBR on carbon content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	208
8.1.4	Effect of seed soaking with EBR on carbon content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	209
8.1.5	Correlation between target (experimental) and output (simulated) carbon contents using ANN model ($p < 0.001$).	209
8.1.6	Effect of seed soaking with EBR on nitrogen content in <i>B. juncea</i> seedlings grown under IMI toxicity.	210
8.1.7	Effect of seed soaking with EBR on nitrogen content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	211
8.1.8	Effect of seed soaking with EBR on nitrogen content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	212
8.1.9	Effect of seed soaking with EBR on nitrogen content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	212
8.1.10	Correlation between target (experimental) and output (simulated) nitrogen contents using ANN model ($p < 0.001$).	213

Fig. No.	Description	Page No.
8.1.11	Effect of seed soaking with EBR on sodium content in <i>B. juncea</i> seedlings grown under IMI toxicity.	214
8.1.12	Effect of seed soaking with EBR on sodium content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	215
8.1.13	Effect of seed soaking with EBR on sodium content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	216
8.1.14	Effect of seed soaking with EBR on sodium content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	216
8.1.15	Correlation between target (experimental) and output (simulated) sodium contents using ANN model ($p < 0.001$).	217
8.1.16	Effect of seed soaking with EBR on magnesium content in <i>B. juncea</i> seedlings grown under IMI toxicity.	218
8.1.17	Effect of seed soaking with EBR on magnesium content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	219
8.1.18	Effect of seed soaking with EBR on magnesium content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	219
8.1.19	Effect of seed soaking with EBR on magnesium content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	220
8.1.20	Correlation between target (experimental) and output (simulated) magnesium contents using ANN model ($p < 0.001$).	220
8.1.21	Effect of seed soaking with EBR on phosphorous content in <i>B. juncea</i> seedlings grown under IMI toxicity.	221
8.1.22	Effect of seed soaking with EBR on phosphorous content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	222
8.1.23	Effect of seed soaking with EBR on phosphorous content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	223
8.1.24	Effect of seed soaking with EBR on phosphorous content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	223
8.1.25	Correlation between target (experimental) and output (simulated) phosphorous contents using ANN model ($p < 0.001$).	224
8.1.26	Effect of seed soaking with EBR on sulphur content in <i>B. juncea</i> seedlings grown under IMI toxicity.	225
8.1.27	Effect of seed soaking with EBR on sulphur content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	226
8.1.28	Effect of seed soaking with EBR on sulphur content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	227
8.1.29	Effect of seed soaking with EBR on sulphur content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	227

Fig. No.	Description	Page No.
8.1.30	Correlation between target (experimental) and output (simulated) sulphur contents using ANN model ($p < 0.001$).	228
8.1.31	Effect of seed soaking with EBR on potassium content in <i>B. juncea</i> seedlings grown under IMI toxicity.	229
8.1.32	Effect of seed soaking with EBR on potassium content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	230
8.1.33	Effect of seed soaking with EBR on potassium content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	230
8.1.34	Effect of seed soaking with EBR on potassium content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	231
8.1.35	Correlation between target (experimental) and output (simulated) potassium contents using ANN model ($p < 0.001$).	231
8.1.36	Effect of seed soaking with EBR on calcium content in <i>B. juncea</i> seedlings grown under IMI toxicity.	232
8.1.37	Effect of seed soaking with EBR on calcium content in the leaves of <i>B. juncea</i> plants (30 DAS) grown under IMI toxicity.	233
8.1.38	Effect of seed soaking with EBR on calcium content in the leaves of <i>B. juncea</i> plants (60 DAS) grown under IMI toxicity.	234
8.1.39	Effect of seed soaking with EBR on calcium content in the leaves of <i>B. juncea</i> plants (90 DAS) grown under IMI toxicity.	234
8.1.40	Correlation between target (experimental) and output (simulated) calcium contents using ANN model ($p < 0.001$).	235
9.1.1.1	Effect of seed soaking with EBR on the expression of stress marker genes in <i>B. juncea</i> seedlings grown under IMI toxicity.	238
9.1.2.1	Effect of seed soaking with EBR on the gene expression of antioxidant enzymes in <i>B. juncea</i> seedlings grown under IMI toxicity.	241
9.1.2.2	Effect of seed soaking with EBR on the gene expression of GST enzyme in <i>B. juncea</i> seedlings grown under IMI toxicity.	242
9.1.2.3	Effect of seed soaking with EBR on the expression of genes related to glutathione regulation in <i>B. juncea</i> seedlings grown under IMI toxicity.	244
9.1.2.4	Effect of seed soaking with EBR on the expression of genes involved in the biosynthesis of pigments and phenolic compounds in <i>B. juncea</i> seedlings grown under IMI toxicity.	244
9.1.2.5	Effect of seed soaking with EBR on the gene expression of pesticide detoxification enzymes in <i>B. juncea</i> seedlings grown under IMI toxicity.	245

Fig. No.	Description	Page No.
9.1.3.1	Effect of seed soaking with EBR on the gene expression of enzymes involved in organic acid metabolism in <i>B. juncea</i> seedlings grown under IMI toxicity.	247
9.2.1	Effect of seed soaking with EBR on IMI residue content in <i>B. juncea</i> seedlings grown under IMI toxicity.	249
9.2.2	Effect of seed soaking with EBR on IMI residue content in the leaves of <i>B. juncea</i> plants (65 DAS) grown under IMI toxicity.	250
9.2.3	Effect of seed soaking with EBR on IMI residue content in the green pods of <i>B. juncea</i> plants (80 DAS) grown under IMI toxicity.	251
9.2.4	Correlation between target (experimental) and output (simulated) IMI residue contents using ANN model ($p < 0.001$).	251