

Table A4.2. Characteristics of selected MaxEnt models for the example data set (*Scorzonera humulis*), built by forward stepwise variable selection in three stages. St = stage; Cy = iteration cycle within stage; Mo = model number (sorted from high to low FVA within each cycle); m = number of derived variables in model; AUC = AUC value based upon the data used to parameterise the model (training AUC); FVA = fractional variation accounted for; Δ FVA = additional fractional variation accounted for, compared to the best model in the previous cycle; F = F value; dfe = degrees of freedom for the numerator; dfa = degrees of freedom for the denominator; P -value for F in an F -ratio test of nested models (relative to the best model in the previous cycle). Abbreviations of explanatory variable (EV) names are explained in the text and in Table A4.1. Derived variables (DVs) are named by combining the abbreviated EV name followed by underscore and (see Table A3-1 for further explanation): Lin = L-type; ZSk = Zero-skewness transformed variable of the M-type; Dev# = D-type variable, # = 1, 2 and 3 refer to values of 0.5, 1 and 2 for the parameter a in the transformation function, respectively; HFk#, HRk# and Tk# refer to HF-, HR- and T-type variables, with knot positions, $k\#$, $k = 1, \dots, 20$, that corresponded to positions along the ranged EV given by $z_{0j} = 0.050 \cdot k - 0.025$. Two EV names connected by ‘.’ indicates interaction (P-type) variables.

St	Cy	Mo	Explanatory variable	Derived variable	m	AUC	FVA	Δ FVA	F	dfe	dfa	P
A	Obtaining parsimonious sets of derived variables for each explanatory variable											
A1	1	1	ALT	ALT_Dev1	1	0.7012	0.0808		879.25	1	9997	<0.00001
A1	1	2	ALT	ALT_Dev2	1	0.7070	0.0786		852.50	1	9997	<0.00001
A1	1	3	ALT	ALT_Dev3	1	0.7025	0.0634		676.84	1	9997	<0.00001
A1	1	4	ALT	ALT_HFk10	1	0.6124	0.0539		569.87	1	9997	<0.00001
A1	1	5	ALT	ALT_Tk11	1	0.5974	0.0499		525.13	1	9997	<0.00001
A1	1	6	ALT	ALT_HRk05	1	0.5745	0.0189		192.34	1	9997	<0.00001
A1	1	7	ALT	ALT_Tk03	1	0.5629	0.0186		189.36	1	9997	<0.00001
A1	1	8	ALT	ALT_Lin	1	0.5359	0.0001		1.06	1	9997	0.30386
A1	1	9	ALT	ALT_ZSk	1	0.5356	0.0011		10.96	1	9997	0.00093
A1	2	1	ALT	ALT_Dev1 ALT_HFk10	2	0.7204	0.1005	0.0197	218.54	1	9996	<0.00001
A1	2	2	ALT	ALT_Dev1 ALT_Tk11	2	0.7170	0.0993	0.0184	204.42	1	9996	<0.00001
A1	2	3	ALT	ALT_Dev1 ALT_HRk05	2	0.7087	0.0829	0.0020	21.92	1	9996	<0.00001
A1	2	4	ALT	ALT_Dev1 ALT_Tk03	2	0.7029	0.0815	0.0007	7.64	1	9996	0.00571
A1	2	5	ALT	ALT_Dev1 ALT_Dev2	2	0.7016	0.0812	0.0004	3.82	1	9996	0.05066
A1	2	6	ALT	ALT_Dev1 ALT_Dev3	2	0.7012	0.0810	0.0002	1.74	1	9996	0.18765
A1	3	1	ALT	ALT_Dev1 ALT_HFk10 ALT_Tk11	3	0.7194	0.1010	0.0005	6.03	1	9995	0.01405
A1	3	2	ALT	ALT_Dev1 ALT_HFk10 ALT_HRk05	3	0.7187	0.1018	0.0013	14.57	1	9995	0.00014

St	Cy	Mo	Explanatory variable	Derived variable	<i>m</i>	AUC	FVA	Δ FVA	<i>F</i>	df _e	df _a	<i>P</i>
A2	1	1	DIA	DIA_ZSk	1	0.8096	0.2045		2570.18	1	9997	<0.00001
A2	1	2	DIA	DIA_Lin	1	0.8096	0.1161		1312.92	1	9997	<0.00001
A2	1	3	DIA	DIA_Tk16	1	0.5055	0.0017		17.04	1	9997	0.00004
A2	1	4	DIA	DIA_HFk14	1	0.5029	0.0005		4.89	1	9997	0.02705
A2	2	1	DIA	DIA_ZSk DIA_Lin	2	0.8192	0.2150	0.0104	132.92	1	9996	<0.00001
A3	1	1	DIR	DIR_ZSk	1	0.8457	0.2785		3857.92	1	9997	<0.00001
A3	1	2	DIR	DIR_Lin	1	0.8667	0.2769		3828.56	1	9997	<0.00001
A3	2	1	DIR	DIR_ZSk DIR_Lin	2	0.8463	0.2874	0.0090	125.84	1	9996	<0.00001
A4	1	1	SOE	SOE_Tk11	1	0.5634	0.0128		129.41	1	9997	<0.00001
A4	1	2	SOE	SOE_HRk12	1	0.5651	0.0093		93.84	1	9997	<0.00001
A4	1	3	SOE	SOE_HFk08	1	0.5639	0.0047		47.24	1	9997	<0.00001
A4	1	4	SOE	SOE_Lin	1	0.5639	0.0046		45.95	1	9997	<0.00001
A4	1	5	SOE	SOE_ZSk	1	0.5642	0.0044		43.69	1	9997	<0.00001
A4	1	6	SOE	SOE_HFk13	1	0.5079	0.0013		12.88	1	9997	0.00033
A4	2	1	SOE	SOE_Tk11 SOE_HRk12	2	0.5651	0.0134	0.0006	5.82	1	9996	0.01585
A4	2	2	SOE	SOE_Tk11 SOE_HFk08	2	0.5629	0.0128	0.0000	0.32	1	9996	0.56967
A4	2	3	SOE	SOE_Tk11 SOE_Lin	2	0.5634	0.0128	0.0000	0.00	1	9996	1.00000
A4	2	4	SOE	SOE_Tk11 SOE_ZSk	2	0.5634	0.0128	0.0000	0.00	1	9996	1.00000
A5	1	1	SOS	SOS_Tk18	1	0.5565	0.0097		98.40	1	9997	<0.00001
A5	1	2	SOS	SOS_HFk16	1	0.5514	0.0056		56.59	1	9997	<0.00001
A5	1	3	SOS	SOS_Lin	1	0.5514	0.0049		49.17	1	9997	<0.00001
A5	1	4	SOS	SOS_ZSk	1	0.5515	0.0045		45.63	1	9997	<0.00001
A5	1	5	SOS	SOS_Tk13	1	0.5029	0.0010		10.00	1	9997	0.00157
A5	2	1	SOS	SOS_Tk18 SOS_Lin	2	0.5514	0.0099	0.0002	1.61	1	9996	0.20431
A5	2	2	SOS	SOS_Tk18 SOS_HFk16	2	0.5514	0.0098	0.0001	0.64	1	9996	0.42209
A5	2	3	SOS	SOS_Tk18 SOS_ZSk	2	0.5565	0.0097	0.0000	0.00	1	9996	1.00000
A6	1	1	SOW	SOW_Tk03	1	0.5662	0.0119		120.58	1	9997	<0.00001
A6	1	2	SOW	SOW_HRk05	1	0.5589	0.0079		79.56	1	9997	<0.00001
A6	1	3	SOW	SOW_ZSk	1	0.5592	0.0051		51.10	1	9997	<0.00001
A6	1	4	SOW	SOW_Lin	1	0.5590	0.0033		33.40	1	9997	<0.00001
A6	1	5	SOW	SOW_Tk07	1	0.5067	0.0023		23.45	1	9997	<0.00001

St	Cy	Mo	Explanatory variable	Derived variable	<i>m</i>	AUC	FVA	ΔFVA	<i>F</i>	df _e	df _a	<i>P</i>
A6	1	6	SOW	SOW_HFk06	1	0.5051	0.0012		12.24	1	9997	0.00047
A6	2	1	SOW	SOW_Tk03 SOW_Tk07	2	0.5764	0.0160	0.0041	41.51	1	9996	<0.00001
A6	2	2	SOW	SOW_Tk03 SOW_Lin	2	0.5735	0.0122	0.0003	2.91	1	9996	0.08820
A6	2	3	SOW	SOW_Tk03 SOW_HRk05	2	0.5589	0.0119	0.0000	0.32	1	9996	0.56984
A6	2	4	SOW	SOW_Tk03 SOW_ZSk	2	0.5733	0.0119	0.0000	0.00	1	9996	1.00000
A7	1	1	TWI	TWI_Tk08	1	0.5532	0.0094		94.82	1	9997	<0.00001
A7	1	2	TWI	TWI_HFk06	1	0.5390	0.0044		43.69	1	9997	<0.00001
A7	1	3	TWI	TWI_HRk11	1	0.5411	0.0041		40.80	1	9997	<0.00001
A7	1	4	TWI	TWI_Lin	1	0.5350	0.0029		29.55	1	9997	<0.00001
A7	1	5	TWI	TWI_ZSk	1	0.5368	0.0019		18.64	1	9997	0.00002
A7	1	6	TWI	TWI_Tk03	1	0.5088	0.0010		10.32	1	9997	0.00132
A7	1	7	TWI	TWI_HRk03	1	0.5088	0.0008		7.77	1	9997	0.00534
A7	1	8	TWI	TWI_Tk14	1	0.5037	0.0005		4.89	1	9997	0.02705
A7	2	1	TWI	TWI_Tk08 TWI_Lin	2	0.5714	0.0113	0.0019	19.37	1	9996	0.00001
A7	2	2	TWI	TWI_Tk08 TWI_HFk06	2	0.5686	0.0109	0.0015	14.84	1	9996	0.00012
A7	2	3	TWI	TWI_Tk08 TWI_HRk11	2	0.5654	0.0103	0.0009	9.03	1	9996	0.00267
B Obtaining best no-interaction model (parsimonious set of explanatory variables)												
B	1	1	DIR		2	0.8463	0.2874		2015.97	2	9996	<0.00001
B	1	2	DIA		2	0.8192	0.2150		1368.51	2	9996	<0.00001
B	1	3	ALT		2	0.7204	0.1005		558.46	2	9996	<0.00001
B	1	4	SOE		1	0.5634	0.0128		129.41	1	9997	<0.00001
B	1	5	SOS		1	0.5565	0.0097		98.40	1	9997	<0.00001
B	1	6	TWI		1	0.5532	0.0094		94.82	1	9997	<0.00001
B	1	7	SOW		2	0.5764	0.0160		81.29	2	9996	<0.00001
B	2	1	DIR DIA		4	0.8992	0.3843	0.0969	786.37	2	9994	<0.00001
B	2	2	DIR ALT		4	0.8818	0.3427	0.0553	420.62	2	9994	<0.00001
B	2	3	DIR SOE		3	0.8537	0.2929	0.0055	78.07	1	9995	<0.00001
B	2	4	DIR SOW		4	0.8549	0.2932	0.0058	41.08	2	9994	<0.00001
B	2	5	DIR SOS		3	0.8531	0.2911	0.0037	52.21	1	9995	<0.00001
B	2	6	DIR TWI		3	0.8503	0.2883	0.0009	12.55	1	9995	0.00040
B	3	1	DIR DIA ALT		6	0.9076	0.4097	0.0253	214.51	2	9992	<0.00001

St	Cy	Mo	Explanatory variable	Derived variable	<i>m</i>	AUC	FVA	Δ FVA	<i>F</i>	df _e	df _a	<i>P</i>
B	3	2	DIR DIA SOE		5	0.9012	0.3915	0.0072	118.49	1	9993	<0.00001
B	3	3	DIR DIA SOS		5	0.8995	0.3878	0.0035	57.32	1	9993	<0.00001
B	3	4	DIR DIA SOW		6	0.8995	0.3880	0.0037	30.49	2	9992	<0.00001
B	4	1	DIR DIA ALT SOE		7	0.9087	0.4164	0.0067	114.76	1	9991	<0.00001
B	4	2	DIR DIA ALT SOS		7	0.9080	0.4128	0.0031	52.68	1	9991	<0.00001
B	4	3	DIR DIA ALT SOW		8	0.9082	0.4127	0.0030	25.52	2	9990	0.00000
C Obtaining best model with interactions												
C	1	1	DIA:ALT	DIA:ALT	11	0.9105	0.4212	0.0048	20.79	4	9987	0.00000
C	1	2	DIA:SOE	DIA:ALT	9	0.9100	0.4196	0.0032	27.75	2	9989	0.00000
C	1	3	DIR:DIA	DIA:ALT	11	0.9072	0.4193	0.0030	12.77	4	9987	<0.00001
C	1	4	ALT:SOE	DIA:ALT	9	0.9096	0.4188	0.0025	21.12	2	9989	<0.00001
C	1	5	DIR:ALT	DIR:ALT	11	0.9081	0.4170	0.0006	2.73	4	9987	0.02733
C	1	6	DIR:SOE	DIR:SOE	9	0.9087	0.4162	-0.0002	-1.64	2	9989	1.00000
C	2	1	DIA:ALT DIA:SOE	DIA:ALT DIA:SOE	13	0.9117	0.4240	0.0028	24.63	4	9985	<0.00001
C	2	2	DIA:ALT DIR:DIA	DIA:ALT DIA:SOE	15	0.9091	0.4241	0.0029	12.45	2	9983	<0.00001
C	2	3	DIA:ALT ALT:SOE	DIA:ALT DIA:SOE	13	0.9113	0.4233	0.0021	18.52	4	9985	<0.00001
C	3	1	DIA:ALT DIA:SOE DIR:DIA	DIA:ALT DIA:SOE	17	0.9103	0.4266	0.0026	11.39	4	9981	<0.00001
C	3	2	DIA:ALT DIA:SOE ALT:SOE	DIA:ALT DIA:SOE	15	0.9117	0.4251	0.0011	9.42	2	9983	0.00008