Supplement A

Variable Name	Variable Type	Number of states	regulators	Regulatory logic	literature	comments
calcineurin pathway					**1**	
Ca Stress	environmental stimulation	3		-		
Calmodulin	protein	3	Ca Stress	Ca Stress=0/1/2 => 0/1/2		
Calcineurin	protein	3	Calmodulin	Calmodulin=0/1/2 => 0/1/2		
Crz1	protein	3	Calcineurin,PKA	if(PKA==0) {calcineurin=0/1/2 =>1/2/2} else{calcineurin=0/1/2 => 1/1/2}	2	
Pmc1	gene	3	Crz1	Crz1-module regulation(see below)		logic refinement
Osmolarity pathway					**3**	
Turgor pressure	environmental stimulation	5		-		
Osmotic stress	general	5	Turgor pressure	Turgor pressure=0/1/2/3/4 => 0/1/2/3/4		
PKA	protein	3	Osmotic stress	Osmotic stress=0/1/2/3/4 => 2/2/2/2/0		
Sko1	protein	3	PKA	PKA=0/1/2 => 0/1/2		
Sln1	protein	3	Turgor pressure	Turgor pressure=0/1/2/3/4 => 2/1/0/0/0		
Ypd1	protein	3	Sln1	Sln1=0/1/2 => 0/1/2		
Ssk1	protein	3	Ypd1	Ypd1=0/1/2 => 2/1/0		
Ssk2/22	protein	3	Ssk1	Ssk11=0/1/2 => 0/1/2		
Pbs2 scaffold	protein	3		constant 1		
Msb2	protein	3	Turgor pressure	Turgor pressure=0/1/2/3/4 => 0/1/2/2/2	5	
Sho1	protein	3	Turgor pressure	Turgor pressure=0/1/2/3/4 => 0/0/2/2/2		
Ste20	protein	3	Sho1	Sho1=0/1/2 => 0/1/2		
Ste50	protein	3	Sho1	Sho1=0/1/2 => 0/1/2		
Cdc24	protein	3	Sho1	Sho1=0/1/2 => 0/1/2		
Cdc42	protein	3	Sho1	Sho1=0/1/2 => 0/1/2		
Ste11	protein (osmotic pathway)	3	Ste20/50,Pbs2Scaffold,Cdc24,Cdc42	Min(Ste20/50,Pbs2scaffold,Cdc24,Cdc42) == 0/1/2 => 0/1/2	5	
Pbs2	protein	3	Ssk2/22, Ste11, Osmotic Stress	{Osmotic stress == 5 => 2} {else max(Ssk2/22,Ste11)=0/1/2 => 0/1/2}		structure refinement
Hog1	protein	3	Pbs2,Ptc1,Ptp2,Crz1	if(max(Ptp2,Ptc1) == 2 => 0)elseif(Crz1 = 0/1){pbs2 = 0/1/2 => 0/1/2} else {pbs2 =0/1/2 => 0/0/1}		structure refinement
Rpd3	protein	3	Hog1	Hog1=0/1/2 => 0/1/2	4	
Tup1	protein	3	Hog1	Hog1=0/1/2 => 0/1/2		
Msn2/4	protein	3	Hog1,PKA	Regulated by Msn2/4 module regulation (see below)	6	
Hot1	protein	3	Hog1	Hog1=0/1/2 => 0/1/2		
Msn1	protein	3	Hog1	Hog1=0/1/2 => 0/1/2		
Ptc1	protein	3	-	constant 1		
Ptp2	protein	3	-	constant 1		
Ena1	gene	3	Hog1,Sko1,Crz1	Sko1-crz1-module regulation(see below)		logic refinement

Gre2	gene	3	Hog1,Sko1	Sko1-module regulation(see below)		logic refinement
Glr1	gene	3	Hog1,Sko1	Sko1-module regulation(see below)		logic refinement
Stl1	gene	3	Hot1,Msn1	Hot1/Msn1-module regulation(see below)		logic refinement
Hor2	gene	3	Hot1,Msn1	Hot1/Msn1-module regulation(see below)		logic refinement
Gpd1	gene	3	Hot1,Msn1	Hot1/Msn1-module regulation(see below)		logic refinement
Hsp12	gene	3	Msn2/4	Msn2/4-module regulation(see below)		logic refinement
Ctt1	gene	3	Msn2/4	Msn2/4-module regulation(see below)		logic refinement
Mating/Psaudohyphae pathways					**3**	
$Ste11^{M}$	protein (mating pathway)	3	Ste20/50,Cdc24, Cdc42,Msb2,Hog 1	Activated by Sho1-branch/Msb2 and repressed by Hog1 (see below)	5,7	structure refinement
ste7	protein	3	Ste11	Ste11=0/1/2 => 0/1/2		
Ptp3	protein	3	-	constant 1		
Msg5	protein	3	-	constant 1		
Fus3/Kss1	protein	3	Ste7,Ptp3,Msg5	if(Max(Ptp3,Msg5)==2 => 0) else{Ste7=0/1/2 => 0/1/2}		logic refinement
Ste12	protein	3	Fus3/Kss1	Fus3/Kss1=0/1/2 => 0/1/2		
Tec1	gene	3	Ste12	Ste12-module regulation(see below)		logic refinement
Fus3	gene	3	Ste12	Ste12-module regulation(see below)		logic refinement
Model adapted for testing the Hog1 modes - addition of two variables:					**3**	
$Pbs2^{(2)}$	protein	3	Ssk2/22, Ste11, Osmotic Stress	max(Ssk2/22,Ste11)=0/1/2 => 0/1/2		structure refinement
$Hog1^{(2)}$	protein	3	$Pbs2^{(2)}$,Ptc1,Ptp2 ,Crz1	if(max(Ptp2,Ptc1) == 2 => 0)elseif(Crz1 = 0/1){$pbs2^{(2)}$ = 0/1/2 => 0/1/2} else {$pbs2^{(2)}$ =0/1/2 => 0/0/1}		structure refinement

Detailed regulatory logics

Ste11^{M} regulation

regulator1	regulator2	ouput
Hog1	Max(Min(Cdc24,Cdc42,Ste20,Ste50),Msb2)	Ste11M
0	0	0
0	1	1
0	2	2
1	0	0
1	1	1
1	2	1
2	0	0
2	1	0
2	2	0

Msn2/4 regulation

regulator1	regulator2	ouput
Hog1	PKA	n2/4-module
0	0	2
0	1	1
0	2	0
1	0	2
1	1	1
1	2	1
2	0	2
2	1	2
2	2	2

Sko1-module regulation

regulator1	regulator2	ouput
Sko1	Hog1	ko1-module
0	0	1
0	1	2
0	2	2
1	0	0
1	1	2
1	2	2
2	0	0
2	1	2
2	2	2

Hot1/Msn1-module regulati min(Hot1,Msn1) = 0/1/2 => 01/2

Msn2/4-module regulation Msn2/4 =0/1/2 =>0/1/2

Sko1-Crz1-module regulati if {Crz1 =0 => 0} else {Sko1-module regulation)

Crz1-module regulation Crz1=0/1/2 => 0/1/2

Ste12-module regulation Ste12=0/1/2 => 0/1/2

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