

Table S1: Parameters for seedbanking annual – non-seedbanking annual interactions

Scenario 1: Different limiting resources (opposite environments favorable)

Environment	Species	Fecundity (f)	Seed survival (d)	Seed germination (g)	Competitive effect of non-seedbanking annual (α_a)	Competitive effect of seedbanking annual (α_b)
Favorable for stage-structured species	Seedbanking annual (b)	25	0.8	0.5	0.005	0.022
Unfavorable for stage-structured species	Seedbanking annual (b)	12	0.8	0.3	0.015	0.007
Favorable for stage-structured species	Non-seedbanking annual (a)	5	0	0.8	0.01	0.012
Unfavorable for stage-structured species	Non-seedbanking annual (a)	40	0	0.8	0.03	0.004

Scenario 2: Water limitation (same environment favorable, weaker competition in favorable environment)

Environment	Species	Fecundity (f)	Seed survival (d)	Seed germination (g)	Competitive effect of non-seedbanking annual (α_a)	Competitive effect of seedbanking annual (α_b)
Favorable for stage-structured species	Seedbanking annual (b)	25	0.8	0.5	0.005	0.007
Unfavorable for stage-structured species	Seedbanking annual (b)	12	0.8	0.3	0.015	0.022
Favorable for stage-structured species	Non-seedbanking annual (a)	40	0	0.8	0.01	0.004
Unfavorable for stage-structured species	Non-seedbanking annual (a)	5	0	0.8	0.03	0.012

Scenario 3: Light limitation (same environment favorable, stronger competition in favorable environment)

Environment	Species	Fecundity (f)	Seed survival (d)	Seed germination (g)	Competitive effect of non-seedbanking annual (α_a)	Competitive effect of seedbanking annual (α_b)
Favorable for stage-structured species	Seedbanking annual (b)	25	0.8	0.5	0.015	0.022
Unfavorable for stage-structured species	Seedbanking annual (b)	12	0.8	0.3	0.005	0.007
Favorable for stage-structured species	Non-seedbanking annual (a)	40	0	0.8	0.03	0.012
Unfavorable for stage-structured species	Non-seedbanking annual (a)	5	0	0.8	0.01	0.004

Table S2: Parameters for perennial – non-seedbanking annual interactions

Scenario 1: Different limiting resources (opposite environments favorable)

Environment	Species	Fecundity (f)	Seed germination (g)	Plant survival (s)	Competitive effect of non-seedbanking annual (α_a)	Competitive effect of perennial adult (α_p)	Competitive effect of perennial seedling (α_p)
Favorable for stage-structured species	Perennial adult (P)	200		0.97	0.001	0.18	0
Unfavorable for stage-structured species	Perennial adult (P)	50		0.91	0.003	0.06	0
Favorable for stage-structured species	Perennial seedling (p)		0.3	0.3	0.01	0.15	0.0015
Unfavorable for stage-structured species	Perennial seedling (p)		0.3	0.1	0.03	0.05	0.0005
Favorable for stage-structured species	Non-seedbanking annual (a)	5	0.8		0.01	0.15	0.0015
Unfavorable for stage-structured species	Non-seedbanking annual (a)	40	0.8		0.03	0.05	0.0005

Scenario 2: Water limitation (same environment favorable, weaker competition in favorable environment)

Environment	Species	Fecundity (f)	Seed germination (g)	Plant survival (s)	Competitive effect of non-seedbanking annual (α_a)	Competitive effect of perennial adult (α_p)	Competitive effect of perennial seedling (α_p)
Favorable for stage-structured species	Perennial adult (P)	200		0.97	0.001	0.06	0
Unfavorable for stage-structured species	Perennial adult (P)	50		0.91	0.003	0.18	0
Favorable for stage-structured species	Perennial seedling (p)		0.3	0.3	0.01	0.05	0.0005
Unfavorable for stage-structured species	Perennial seedling (p)		0.3	0.1	0.03	0.15	0.0015
Favorable for stage-structured species	Non-seedbanking annual (a)	40	0.8		0.01	0.05	0.0005
Unfavorable for stage-structured species	Non-seedbanking annual (a)	5	0.8		0.03	0.15	0.0015

Scenario 3: Light limitation (same environment favorable, stronger competition in favorable environment)

Environment	Species	Fecundity (f)	Seed germination (g)	Plant survival (s)	Competitive effect of non-seedbanking annual (α_a)	Competitive effect of perennial adult (α_p)	Competitive effect of perennial seedling (α_p)
Favorable for stage-structured species	Perennial adult (P)	200		0.97	0.003	0.18	0
Unfavorable for stage-structured species	Perennial adult (P)	50		0.91	0.001	0.06	0
Favorable for stage-structured species	Perennial seedling (p)		0.3	0.3	0.03	0.15	0.0015
Unfavorable for stage-structured species	Perennial seedling (p)		0.3	0.1	0.01	0.05	0.0005
Favorable for stage-structured species	Non-seedbanking annual (a)	40	0.8		0.03	0.15	0.0015
Unfavorable for stage-structured species	Non-seedbanking annual (a)	5	0.8		0.01	0.05	0.0005

Figure S1: Partitioning of interaction effect (purple) into the true covariance storage effect (red) and the remnant interaction term (blue), for the perennial invading into a non-seedbanking annual as the resident (first column) and seedbanking annual invading into a non-seedbanking annual (second column). The x-axis denotes different environmental time series, ranging from fully unfavorable for the invader to a fully favorable time series, with 50:50 an even mix through time of the two environmental conditions. Full Idgr is shown in black.

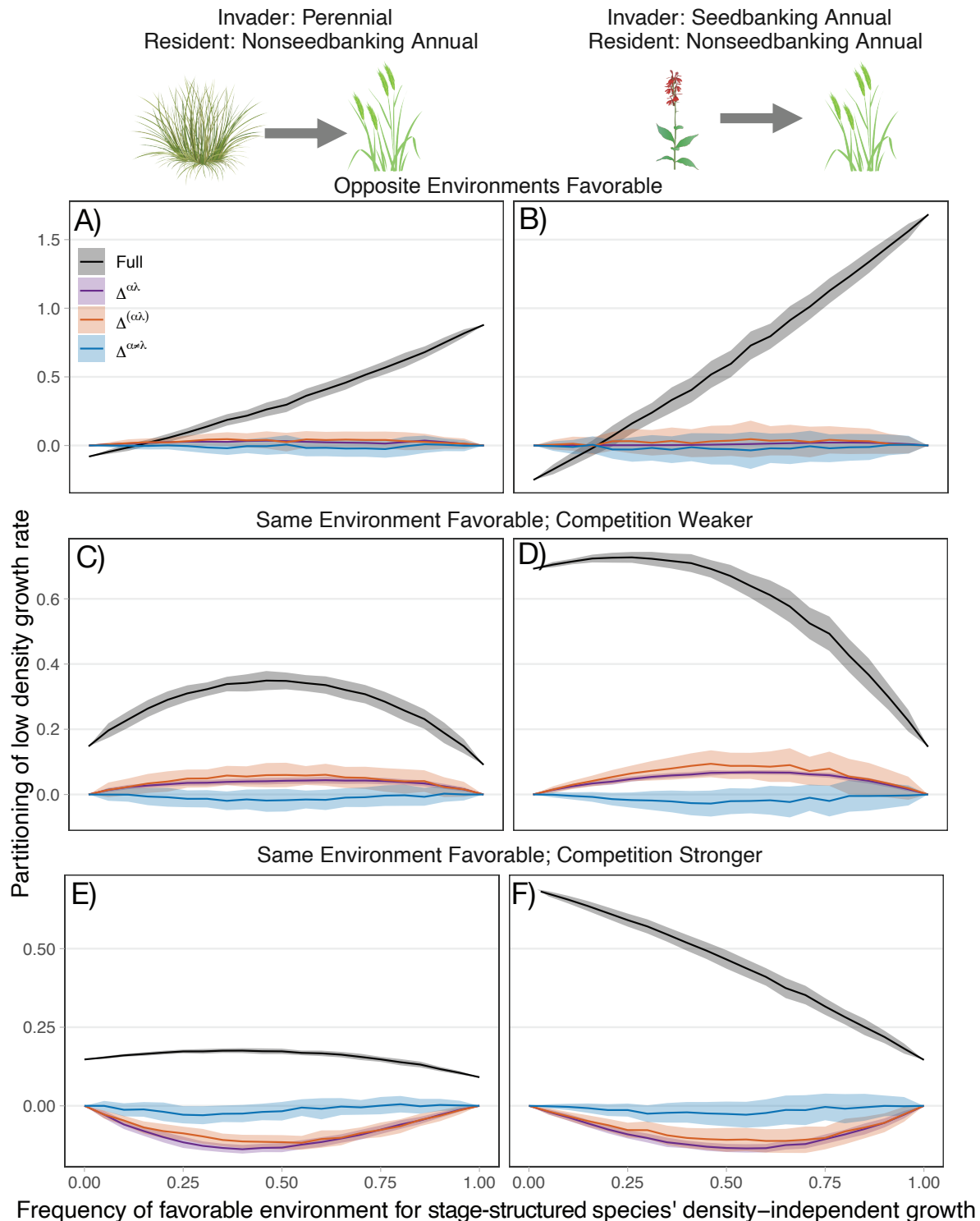


Figure S2: Partitioning of interaction effect (purple) into the true covariance storage effect (red) and the remnant interaction term (blue), for the non-seedbanking annual invading into the perennial as the resident (first column) and into the seedbanking annual as the resident species (second column). The x-axis denotes different environmental time series, ranging from fully unfavorable for the invader to a fully favorable time series. Full Idgr is shown in black.

