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Figure S1. *Top:* A submerged mesh packet of five leaves, constituting an experimental unit, in this case containing green leaves showing regions of necrosis; aluminum tags used to identify pre-weighed leaf packets for mass loss determination are also seen. *Bottom:* Microcosms for the first experiment where green and brown leaf packets were incubated in the same microcosm, with aeration moderated with valves, are shown in a growth chamber; California bay leaf discs used to bait *Phytophthora* spores are visible floating on the water surface.

SUPPLEMENTARY MATERIAL

Aram and Rizzo, forests, 2019

Table S1. Analysis of variance table for leaf colonization by *Phytophthora* in the first experiment where green and brown leaves were maintained in the same microcosm. The linear mixed effects model tested the effect of inoculum (*P. ramorum*, *P. gonapodyides* or the combination of both species), leaf type (green/live or brown/senesced), stream water addition (autoclave-sterilized or non-sterile), and collection time (at 2, 4, 8, 12 and 16 weeks) on the logit transformed proportion of leaf colonized. The response variable represented the level of colonization by *P. ramorum* for the *P. ramorum*-only inoculum treatment and the level of colonization by *P. gonapodyides* for *P. gonapodyides*-only and combined *Phytophthora* spp. treatments, since *P. ramorum* was completely suppressed in combined inoculations. Block and microcosm were included as random variables, the latter nested in the former.

Factor	d.f. num[1]	d.f. den[2]	F value	*P*
Inoculum	2	20	42.818	<.0001
Leaf type	1	167	2.697	0.1024
Stream water addition	1	20	0.548	0.4679
Week (as categorical)[3]	3	167	0.264	0.8513
Inoculum × Leaf	2	167	16.149	<.0001
Inoculum × Stream water	2	20	1.194	0.3238
Leaf × Stream water	1	167	0.107	0.7441
Inoculum × Week	6	167	0.928	0.4761
Leaf × Week	3	167	0.388	0.7617
Stream water × Week	3	167	0.543	0.6538
Inoculum × Leaf × Stream water	2	167	0.744	0.4769
Inoculum × Leaf × Week	6	167	0.569	0.7543
Inoculum × Stream water × Week	6	167	1.042	0.4002
Leaf × Stream water × Week	3	167	0.047	0.9866
Inoculum × Leaf × Stream water × Week	6	167	0.835	0.5446

[1]— degrees of freedom numerator

[2]— degrees of freedom denominator

[3]—Week two as reference category

SUPPLEMENTARY MATERIAL

Aram and Rizzo, forests, 2019

Table S2. Analysis of variance table for leaf colonization by *Phytophthora* in the second experiment where green and brown leaves were maintained in separate microcosms. The linear mixed effects model tested the effect of inoculum (*P. ramorum*, *P. gonapodyides* or the combination of both species), leaf type (green/live or brown/senesced), stream water addition (autoclave-sterilized or non-sterile), and collection time (at 2, 4, 8, 12 and 16 weeks) on the logit transformed proportion of leaf colonized. The response variable represented the level of colonization by *P. ramorum* for the *P. ramorum*-only inoculum treatment and the level of colonization by *P. gonapodyides* for *P. gonapodyides*-only and combined *Phytophthora* spp. treatments, since *P. ramorum* was completely suppressed in combined inoculations. Block and microcosm were included as random variables, the latter nested in the former.

Factor	d.f. num[1]	d.f. den[2]	F value	*P*
Inoculum	2	44	42.643	<.0001
Leaf type	1	44	1.046	0.3121
Stream water addition	1	44	0.372	0.5453
Week (as categorical)[3]	3	143	0.842	0.4733
Inoculum × Leaf	2	44	13.331	<.0001
Inoculum × Stream water	2	44	1.664	0.2011
Leaf × Stream water	1	44	0.014	0.9054
Inoculum × Week	6	143	0.633	0.7035
Leaf × Week	3	143	3.689	0.0135
Stream water × Week	3	143	0.196	0.8988
Inoculum × Leaf × Stream water	2	44	0.283	0.7552
Inoculum × Leaf × Week	6	143	1.124	0.3513
Inoculum × Stream water × Week	6	143	0.426	0.8609
Leaf × Stream water × Week	3	143	0.131	0.9417
Inoculum × Leaf × Stream water × Week	6	143	1.059	0.3899

[1]— degrees of freedom numerator

[2]— degrees of freedom denominator

[3]—Week two as reference category

SUPPLEMENTARY MATERIAL

Aram and Rizzo, forests, 2019

Table S3. Analysis of variance table for leaf colonization by *Phytophthora* in the experiment with yellow leaves only, where only sterile nutrient solution was used in microcosms (i.e. no stream water added). The analysis tested the effect of inoculum (*P. ramorum*-only or the combination of *P. ramorum* and *P. gonapodyides*) and collection time (at 4, 8, 12 and 16 weeks) on the logit transformed proportion of leaf colonized. The response variable represented the level of colonization by *P. ramorum* for the *P. ramorum*-only inoculum treatment and the level of colonization by *P. gonapodyides* for the combined *Phytophthora* spp. treatments, since *P. ramorum* was completely suppressed in combined inoculations. Microcosm was included as a random variable.

Factor	d.f. num[1]	d.f. den[2]	F value	*P*
Inoculum	1	6	11.059	0.0159
Week (as categorical)[3]	2	12	0.035	0.9656
Inoculum × Week	2	12	0.022	0.9780

[1]— degrees of freedom numerator

[2]— degrees of freedom denominator

[3]—Week four as reference category

Table S4. Analysis of variance table for leaf decomposition in the first experiment where green and brown leaves were maintained in the same microcosm. The linear mixed effects model tested the effect of inoculum (*P. ramorum*, *P. gonapodyides* or the combination of both *P*. spp.), leaf type (green/live or brown/senesced), and stream water addition (autoclave-sterilized or non-sterile) on decay constants estimated for each block from percent of original biomass remaining at weeks 4, 6, 8, 12 and 16. Block and microcosm were included as random variables, the latter nested in the former.

Factor	d.f. num[1]	d.f. den[2]	F value	*P*
Inoculum	3	56	0.040	0.9891
Leaf	1	56	109.916	<.0001
Stream water addition	1	56	0.466	0.4977
Inoculum × Leaf	3	56	17.270	<.0001
Inoculum × Stream water	3	56	0.158	0.9239
Leaf × Stream water	1	56	0.001	0.9730
Inoculum × Leaf × Stream water	3	56	0.850	0.4725

[1]— degrees of freedom numerator

[2]— degrees of freedom denominator

SUPPLEMENTARY MATERIAL

Aram and Rizzo, forests, 2019

Table S5. Least-square mean estimates of decay constants (*k*) indicating decomposition rates for treatments in the first experiment where green and brown leaves were maintained in the same microcosm.

Inoculum	Leaf	lsmean	SE	df	lower.CL	upper.CL	Group[1]
None	Green	0.00046	0.00027	4	0.00093	0.00185	1
None	Brown	0.00526	0.00027	4	0.00387	0.00665	23
P. ramorum	Green	0.00448	0.00023	4	0.00328	0.00568	2
P. ramorum	Brown	0.00536	0.00023	4	0.00416	0.00656	23
P. gonapodyides	Green	0.00496	0.00023	4	0.00376	0.00616	23
P. gonapodyides	Brown	0.00523	0.00023	4	0.00403	0.00643	23
Combined	Green	0.00513	0.00023	4	0.00393	0.00633	23
Combined	Brown	0.00557	0.00023	4	0.00437	0.00677	3

[1]—Treatments with the same group number are not statistically different as determined by Tukey's HSD.

SUPPLEMENTARY MATERIAL

Aram and Rizzo, forests, 2019

Table S6. Analysis of variance table for leaf decomposition in the second experiment where green and brown leaves were maintained in separate microcosms. The linear mixed effects model tested the effect of inoculum (*P. ramorum*, *P. gonapodyides* or the combination of both *P*. spp.), leaf type (green/live or brown/senesced), and stream water addition (autoclave-sterilized or non-sterile) on decay constants estimated for each block from percent of original biomass remaining at weeks 4, 6, 8, 12 and 16. Block and microcosm were included as random variables, the latter nested in the former.

Factor	d.f. num	d.f. den	F value	*P*
Inoculum	3	59	0.296	0.8279
Leaf	1	59	0.309	0.5803
Stream water addition	1	59	0.323	0.5717
Inoculum × Leaf	3	59	4.181	0.0094
Inoculum × Stream water	3	59	0.209	0.8895
Leaf × Stream water	1	59	0.651	0.4230
Inoculum × Leaf × Stream water	3	59	0.146	0.9320

Table S7. Least-square mean estimates of decay constants (*k*) indicating decomposition rates for treatments in the second experiment where green and brown leaves were maintained in separate microcosms.

Inoculum	Leaf	lsmean	SE	df	lower.CL	upper.CL	Group[1]
None	Green	0.00406	0.00024	4	0.00283	0.00530	1
None	Brown	0.00406	0.00022	4	0.00290	0.00523	1
P. ramorum	Green	0.00548	0.00022	4	0.00432	0.00665	2
P. ramorum	Brown	0.00394	0.00022	4	0.00277	0.00511	1
P. gonapodyides	Green	0.00529	0.00022	4	0.00412	0.00645	2
P. gonapodyides	Brown	0.00387	0.00022	4	0.00270	0.00504	1
Combined	Green	0.00600	0.00022	4	0.00483	0.00716	2
Combined	Brown	0.00409	0.00022	4	0.00293	0.00526	1

[1]—Treatments with the same group number are not statistically different as determined by Tukey's HSD.

Table S8. Analysis of variance table for leaf decomposition in the experiment with yellow leaves only, where only sterile nutrient solution was used in microcosms (i.e. no stream water added). The analysis of variance tested the effect of inoculum (*P. ramorum*-only or the combination of *P. ramorum* and *P. gonapodyides*) on decay constants estimated for each block from percent of original biomass remaining at weeks 4, 6, 8, 12 and 16. Microcosm was included as a random variable.

Factor	d.f.	SS	MS	F value	*P*
Inoculum	2	2.58×10^{-6}	1.29×10^{-6}	5.366	0.0292
Residuals	9	2.16×10^{-6}	2.40×10^{-7}		

SUPPLEMENTARY MATERIAL

Aram and Rizzo, forests, 2019

SUPPLEMENTARY TABLE 9. Least-square mean estimates of decay constants (*k*) indicating decomposition rates for treatments in experiment with yellow leaves only, where only sterile nutrient solution was used in microcosms (i.e. no stream water added).

Inoculum	lsmean	SE	df	lower.CL	upper.CL	Group[1]
none	0.00474	0.00025	9	0.00418	0.00529	1
P. ramorum	0.00566	0.00025	9	0.00510	0.00621	2
Combined	0.00577	0.00025	9	0.00522	0.00633	2

[1]—Treatments with the same group number are not statistically different as determined by Tukey's HSD.

SUPPLEMENTARY MATERIAL
Aram and Rizzo, forests, 2019

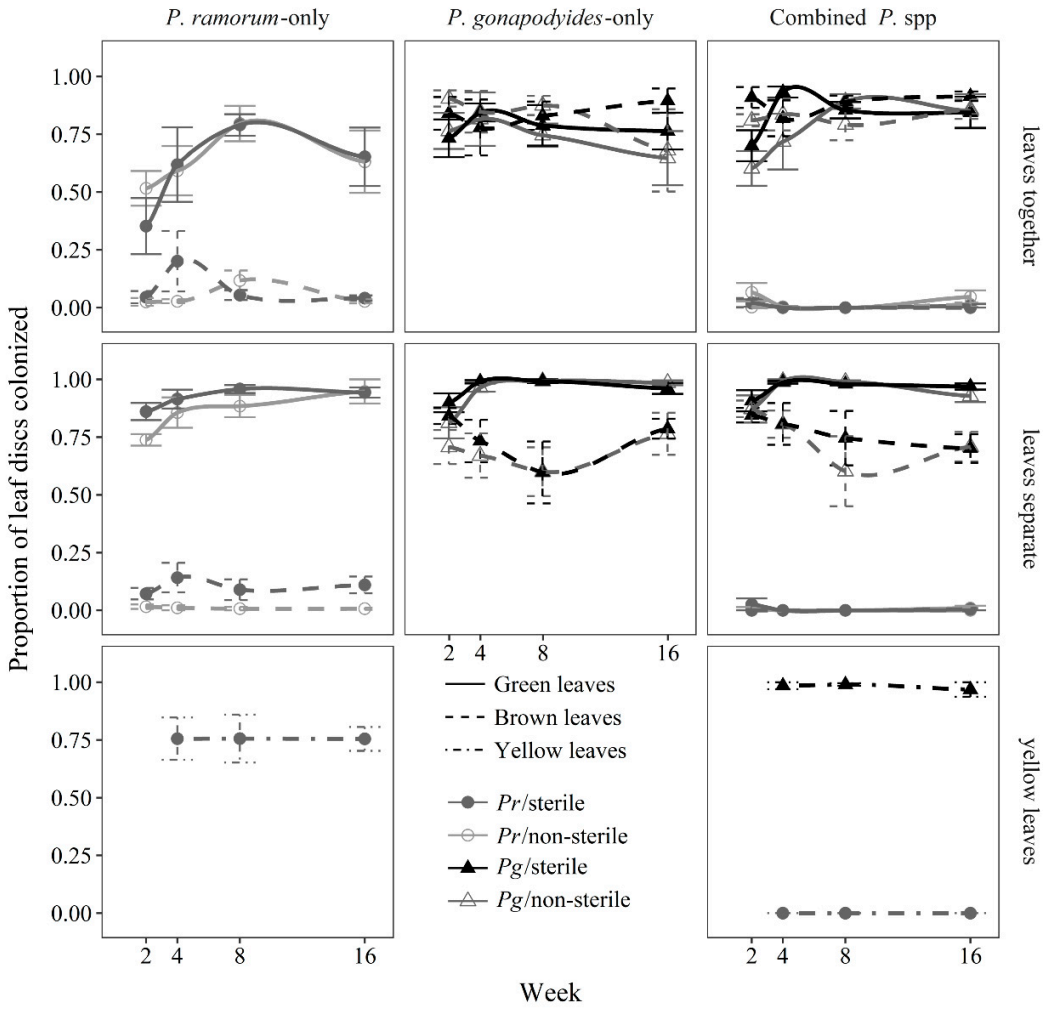

Figure S2. Proportion of green, brown and yellow leaves (designated by line type) colonized by *P. ramorum* (*Pr*) or *P. gonapodyides* (*Pg*) (designated by element shape) in treatments with added autoclaved (sterile) or natural (non-sterile) stream water (designated by element fill and line shade) for three different inoculum treatments (horizontal panels) at sampling intervals over 16 weeks of incubation in three different experiments (vertical panels). Two experiments included green and brown leaves, the first with both leaf types in the same microcosm and the second with each leaf type in different microcosms. One experiment included yellow leaves only with only *P. ramorum* and combined *Phytophthora* spp. inoculation treatments. Bars represent ± standard error, n=5.