Figure S1: Photomicrographs of *Puccinia* uredinospores quantified in some of the aerobiological samples collected with the Lanzoni VPPS 2010 sampler during the study period in the wheat crop of A Limia, Ourense, Spain. 400X magnification.

Table S1. Spearman's correlation between *Puccinia* concentration and weather parameters, maximum, minimum and average temperatures (Max T, Min T, Avg T °C), dew point (°C), relative humidity (RH%), accumulated rain (mm), wind speed (m/s), sun hours (h) and, leaf moisture (h); during the same day and the 1, 2 and 3 previous days in each phenological stage (S0: Germination; S1: Leaf development (main stem); S2: Tillering; S3: Steam elongation; S4: Booting; S5: Inflorescence emergence, heading; S6: Flowering anthesis; S7: Development of fruit; S8: Ripening of fruits and seeds; S9: Senescence). Signification level in bold type ($p < 0.05$).

	2021										
Puccinia	S-0	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	Total
MaxT	0.036	−0.275	0.405	−0.071	−0.036	−0.036	0.325	0.486	0.147	−0.800	**0.296**
MaxT_1	0.164	−0.120	0.262	0.179	−0.288	0.643	−0.228	0.305	0.432	−0.400	**0.340**
MaxT_2	−0.236	0.096	0.667	−0.643	−0.613	**0.821**	−0.154	−0.090	**0.544**	−1.000	**0.310**
MaxT_3	0.091	0.407	0.095	−0.107	−0.750	0.179	−0.297	−0.266	0.150	−0.800	0.191
MinT	0.270	0.156	−0.262	0.250	−0.714	0.613	**−0.555**	0.319	−0.053	0.600	**0.268**
MinT_1	−0.450	−0.383	−0.310	−0.607	−0.679	−0.198	−0.476	−0.004	0.148	−0.800	0.118
MinT_2	0.418	−0.108	−0.357	0.179	**−0.929**	−0.631	0.019	−0.167	0.391	−0.800	0.204
MinT_3	0.450	0.228	0.262	−0.571	−0.541	**−0.857**	0.231	−0.348	0.338	−0.600	**0.277**
AvgT	0.577	−0.323	0.228	0.214	−0.487	0.214	0.152	0.477	0.120	−0.949	**0.389**
AvgT_1	−0.198	−0.228	0.240	−0.393	−0.500	0.750	**−0.600**	0.270	0.502	−0.800	**0.388**
AvgT_2	0.144	−0.060	0.539	−0.071	−0.786	0.577	−0.234	−0.147	**0.731**	−0.800	**0.379**
AvgT_3	0.126	0.479	0.275	−0.541	−0.857	−0.288	−0.206	−0.301	0.510	−0.800	**0.267**
DewP	0.541	−0.168	0.143	0.126	−0.714	0.071	−0.033	0.121	0.175	0.200	**0.243**
DewP_1	−0.378	−0.024	0.167	−0.214	−0.750	**0.857**	**−0.560**	0.007	0.366	−0.200	**0.239**
DewP_2	0.595	0.108	0.429	0.000	**−1.000**	−0.107	−0.280	−0.108	**0.643**	−1.000	**0.236**
DewP_3	0.144	0.527	0.000	−0.714	**−0.739**	−0.429	0.005	−0.253	**0.631**	−0.800	**0.249**
RH	0.414	0.349	−0.071	0.000	−0.509	0.000	−0.225	**−0.631**	−0.050	0.632	−0.175

RH_1	−0.162	0.030	−0.060	0.056	−0.734	−0.541	0.030	−0.155	−0.169	0.894	−0.161
RH_2	0.427	0.048	0.144	−0.206	−0.218	**−0.847**	−0.022	0.323	0.054	−0.211	−0.161
RH_3	0.318	−0.114	−0.180	−0.655	0.382	−0.200	0.207	0.122	0.404	0.316	−0.077
Rain	−0.249	0.192	0.412	0.252	−0.750		0.309		−0.295		**−0.370**
Rain_1	−0.486	−0.069	0.082	−0.259	**−0.757**		0.154		−0.109		**−0.420**
Rain_2	0.449	−0.064	0.247	−0.197	−0.523	−0.612	−0.309		−0.169		**−0.412**
Rain_3	−0.236	0.263	−0.577	−0.394	−0.324	−0.401	−0.154		0.019		**−0.446**
WS	0.685	0.383	−0.190	0.536	0.393	0.607	−0.511	0.108	0.339	0.949	0.011
WS_1	−0.667	0.108	0.072	−0.500	0.750	−0.703	−0.269	−0.240	0.183	−0.211	−0.206
WS_2	0.270	−0.503	−0.228	0.250	0.714	**−0.775**	0.022	0.037	0.015	−0.949	−0.190
WS_3	**0.865**	0.120	−0.277	−0.487	0.679	−0.286	0.341	0.367	−0.452	0.000	−0.157
SunH	−0.252	−0.311	−0.431	−0.143	0.429	0.306	0.122	0.489	0.159	−1.000	0.060
SunH_1	0.270	0.000	0.590	0.234	0.286	0.360	**−0.567**	0.106	0.236	−0.800	0.098
SunH_2	−0.559	−0.371	0.506	−0.432	−0.071	0.631	0.132	−0.097	0.101	−0.600	0.103
SunH_3	0.090	0.263	0.390	0.595	−0.464	0.321	0.138	−0.156	−0.463	0.800	0.062
LeafMoist	0.118	0.185	0.518	0.571	−0.429	0.214	0.330	−0.328	−0.205	0.800	0.054
LeafMoist_1	−0.396	0.148	**0.786**	0.000	−0.286	**0.919**	0.181	0.031	0.104	0.600	0.142
LeafMoist_2	0.523	0.432	**0.714**	−0.214	−0.214	−0.214	−0.214	0.249	0.039	−0.800	0.068
LeafMoist_3	−0.378	0.000	0.143	−0.071	−0.393	−0.536	**−0.593**	−0.236	0.110	−0.800	−0.053

2022

Puccinia	S-0	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	Total
MaxT	0.711	0.704	**0.826**	0.324	0.464	0.321	0.072	−0.134	−0.144	0.535	**0.413**
MaxT_1	**0.842**	0.482	**0.575**	0.450	0.464	0.143	0.342	0.181	−0.378	0.214	**0.365**
MaxT_2	0.318	**0.037**	**0.558**	0.414	0.058	−0.464	0.090	0.044	−0.432	0.099	**0.227**
MaxT_3	−0.299	−0.593	**0.647**	0.126	−0.406	−0.071	0.090	0.073	−0.721	0.211	0.130
MinT	0.255	−0.556	**0.575**	0.234	−0.493	−0.414	0.018	0.307	−0.288	0.208	**0.221**
MinT_1	−0.085	−0.445	**0.827**	**0.918**	−0.174	−0.036	−0.649	0.118	0.126	0.457	**0.231**
MinT_2	−0.604	−0.815	**0.792**	0.336	**−0.812**	0.357	−0.162	−0.013	−0.018	0.116	0.106
MinT_3	−0.019	−0.482	0.432	−0.324	0.058	0.357	0.109	−0.029	**−0.775**	−0.465	−0.054
AvgT	**0.898**	**0.778**	**0.813**	0.180	0.551	0.036	0.090	−0.057	−0.198	**0.633**	**0.428**
AvgT_1	0.748	0.408	**0.771**	0.631	−0.261	0.036	0.090	0.224	−0.198	0.411	**0.388**
AvgT_2	0.281	−0.111	**0.679**	0.270	−0.232	−0.143	0.182	0.081	−0.364	0.321	**0.240**
AvgT_3	−0.415	−0.593	**0.675**	0.109	0.000	−0.107	0.073	−0.040	−0.700	0.149	0.122
DewP	0.599	−0.222	**0.738**	0.180	−0.058	−0.306	0.396	0.135	0.180	0.254	**0.266**
DewP_1	0.150	**−0.964**	**0.846**	0.775	−0.279	−0.216	−0.234	0.282	0.487	0.501	**0.247**
DewP_2	−0.561	−0.111	**0.755**	0.414	−0.309	0.143	−0.216	−0.024	−0.054	0.279	0.128
DewP_3	−0.393	−0.334	**0.570**	−0.288	−0.426	0.464	−0.327	0.045	−0.591	−0.192	−0.013
RH	−0.510	−0.630	**−0.615**	−0.252	−0.485	−0.393	0.173	0.229	0.330	−0.404	**−0.379**
RH_1	**−0.850**	**−0.815**	−0.163	−0.577	−0.493	−0.214	−0.180	−0.092	0.505	−0.137	**−0.404**
RH_2	−0.472	−0.111	−0.100	−0.270	−0.582	0.685	−0.072	−0.155	0.595	−0.075	**−0.265**
RH_3	0.330	0.371	−0.416	−0.455	−0.132	0.342	−0.216	−0.083	0.179	−0.198	−0.201
Rain	−0.403	−0.693	**−0.575**	−0.255	−0.223	−0.074		0.276		−0.155	**−0.281**
Rain_1	**−0.867**	−0.635	**−0.642**	**−0.873**	−0.462	−0.020	0.412	−0.310		−0.309	**−0.362**
Rain_2	−0.653	0.212	**−0.680**	−0.019	−0.471	0.401	−0.270	−0.241		−0.232	**−0.248**
Rain_3	−0.428	0.324	**−0.545**	0.179	−0.203	0.408	−0.378	0.103		−0.077	−0.139
WS	−0.674	−0.111	0.177	0.355	0.029	0.393	0.009	0.387	0.245	0.033	**0.215**
WS_1	−0.655	−0.334	0.163	**0.891**	−0.232	−0.036	−0.136	0.034	0.591	0.057	0.131
WS_2	−0.206	−0.148	0.141	0.450	0.290	0.179	−0.445	0.100	**0.793**	**0.560**	0.119
WS_3	0.449	0.259	0.051	−0.162	0.485	0.214	−0.073	0.185	−0.018	0.265	0.045
SunH	−0.356	0.654	**0.685**	0.487	0.609	0.464	−0.239	−0.248	0.100	0.463	**0.354**
SunH_1	0.524	0.692	0.326	0.667	0.174	0.214	0.308	−0.395	−0.173	−0.104	**0.306**

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SunH_2	**0.842**	0.385	0.353	−0.090	**0.812**	−0.714	0.219	0.237	−0.482	0.077	**0.245**
SunH_3	0.318	−0.231	**0.588**	−0.144	0.116	−0.250	0.112	−0.006	−0.645	0.191	0.179
LeafMoist	0.430	−0.445	**−0.770**	−0.667	0.406	−0.162	−0.541	−0.220	0.667	−0.288	**−0.338**
LeafMoist_1	0.374	−0.408	**−0.614**	−0.613	−0.058	−0.396	0.739	−0.200	0.018	−0.467	**−0.252**
LeafMoist_2	0.151	**0.852**	**−0.663**	0.090	0.145	0.162	0.396	0.232	−0.180	−0.419	−0.132
LeafMoist_3	−0.500	0.037	−0.508	0.360	−0.232	−0.072	−0.198	0.035	0.396	0.164	−0.078

Table S2. Consecutive days in which the meteorological conditions of the Rodriguez-Moreno et al. [10] model is met during our study period. * Nocturnal temperature of the Rodriguez-Moreno et al. [10] model.

Year	Days	Hours	
		20:00–7:00 *	**23:00–7:00**
2021	2	5/08–7/08	14/05–16/05
		4/07–6/07	31/05–2/06
		20/6–22/06	20/06–22/06
		31/5–2/6	10/07–12/07
		14/05–16/05	25/7–27/07
			5/08–7/08
	3	16/06–19/06	
	4		2/07–6/07
			19/07–23/07
	7		12/06–19/06
2022	2	5/06–7/06	17/06–19/06
			21/07–23/07
			28/07–30/07
			4/08–6/08
			10/08–12/08
	3	29/05–1/06	20/05–23/05
			29/05- 1/06
	5		2/07–7/07
	8		5/06–13/06