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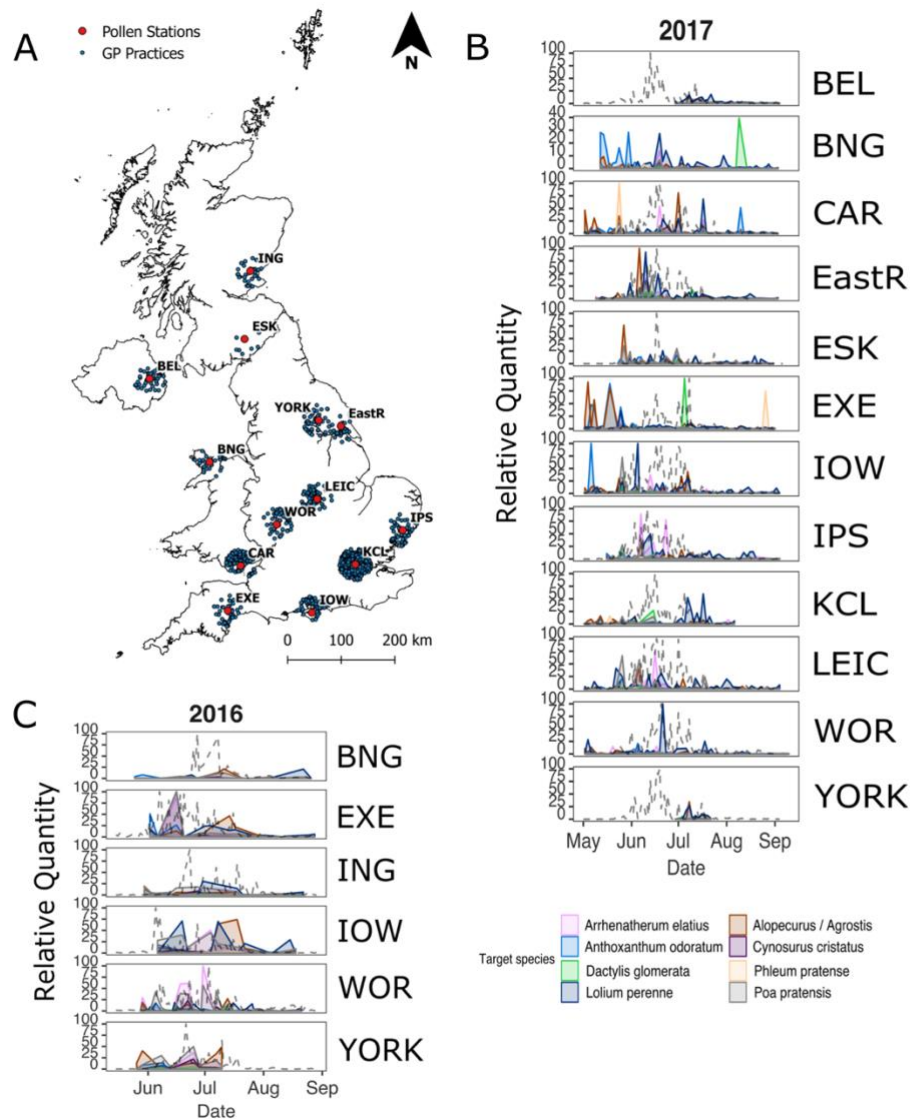[7] The David Hide Asthma & Allergy Research Centre, Isle of Wight, UK
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Figure S1 Pollen abundances and locations of pollen monitoring stations and general practitioner (GP) practices in the United Kingdom. Related to Figures 1-4 and STAR Methods. A) Locations of pollen monitoring stations and GP practices within 30 km buffer zones of pollen monitoring stations. B - C) Abundance of airborne pollen from eight grass species (expressed relative to the maximum abundance for each species) during the grass pollen season of 2016 and 2017. Dashed line shows Poaceae pollen counts relative to the maximum pollen count at each location, collected using Hirst-type volumetric samplers and identified using microscopy (note that pollen concentrations are not available at the Bangor site in 2017). Pollen monitoring station codes, sampling years and numbers of GP practices are as follows: ING: Invergowrie (2016, 61 GPs), ESK: Eskdalemuir (2017, 9 GPs), BEL: Belfast (2017, 156 GPs), YORK: York (2016-2017, 117 GPs), EastR: East Riding (2017, 133 GPs), BNG: Bangor (2016-2017, 60 GPs), LEIC: Leicester (2017, 264 GPs), WOR: Worcester (2016-2017, 216 GPs), IPS: Ipswich (2017, 138 GPs), CAR: Cardiff (2017, 312 GPs), KCL: King's College London (2017, 2375 GPs), EXE: Exeter (2016-2017, 95 GPs), IOW: Isle of Wight (2016-2017, 240 GPs). Note that all pollen monitoring stations are permanent stations managed by the UK Met Office Pollen Monitoring Network, apart from Bangor which was set up as a temporary collection site for this project, using the same pollen count methodologies.
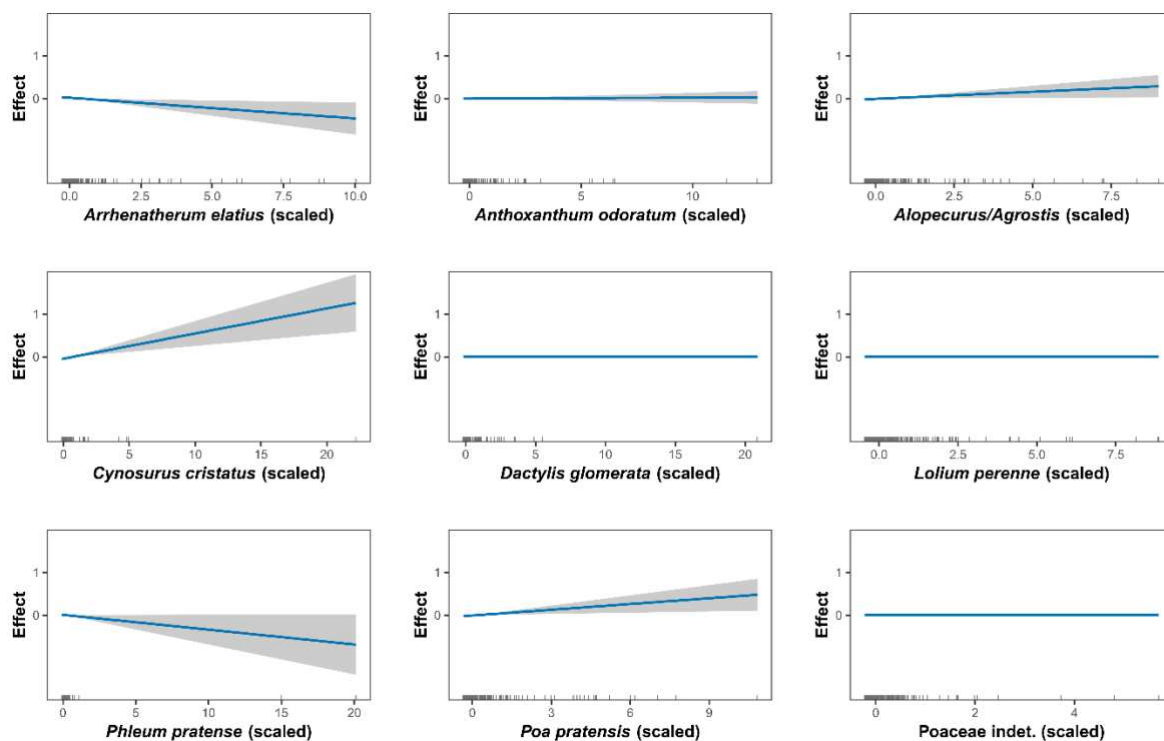
Figure S2 Unadjusted estimated effects of qPCR target species on asthma-related emergency hospital admissions. Related to Figure 2 and STAR Methods. Graphical summary of an unadjusted generalised additive model (GAM) showing the estimated effects of qPCR target species (without covariates) on the occurrence (binary) of emergency asthma related hospital admissions during the grass pollen season (May to September) in the UK within 30 km of pollen monitoring stations (see Figure 1). Rug plots indicate x-axis values. 'Scaled' means the variable has been standardised (zero means and unit variance).
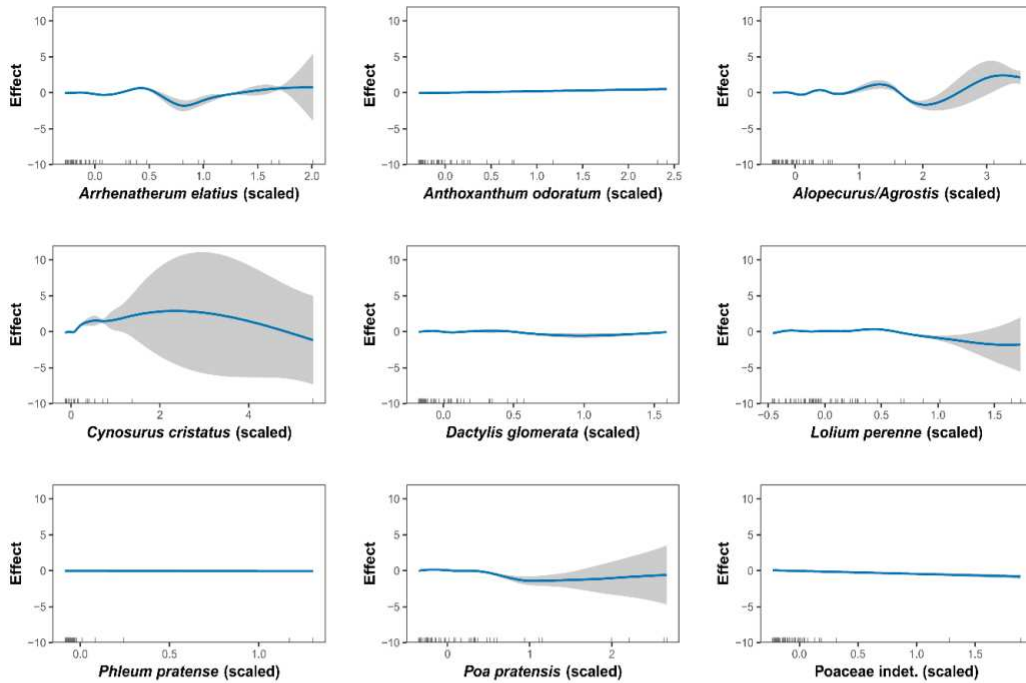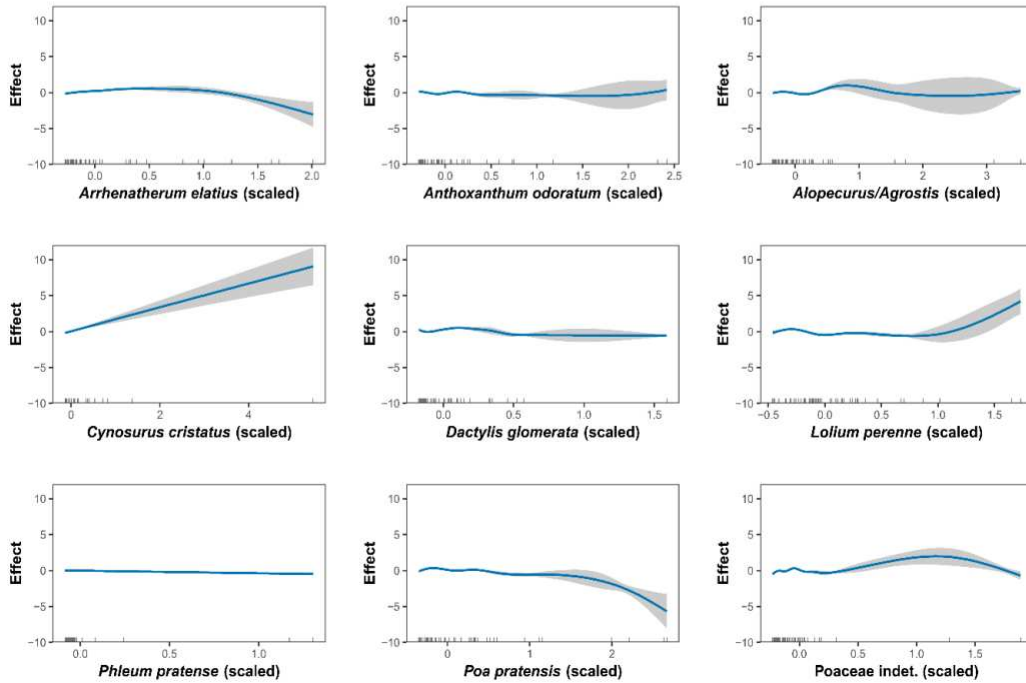
Figure S3 Unadjusted estimated effects of qPCR target species on (A) nasal allergy drug and (B) respiratory antihistamine prescribing rates. Related to Figures 3 and 4 and STAR Methods. Graphical summary of unadjusted generalised additive models (GAMs) showing the estimated effects of qPCR target species (without covariates) on monthly prescribing rates (per 1000 population per day) of (A) drugs for nasal allergy (BNF 12.2.1) and (B) respiratory antihistamines (BNF 3.4.1.) during the grass pollen season (May to September) in the UK within 30 km of pollen monitoring stations (see Figure 1). Rug plots indicate x-axis values. 'Scaled' means the variable has been standardised (zero means and unit variance).
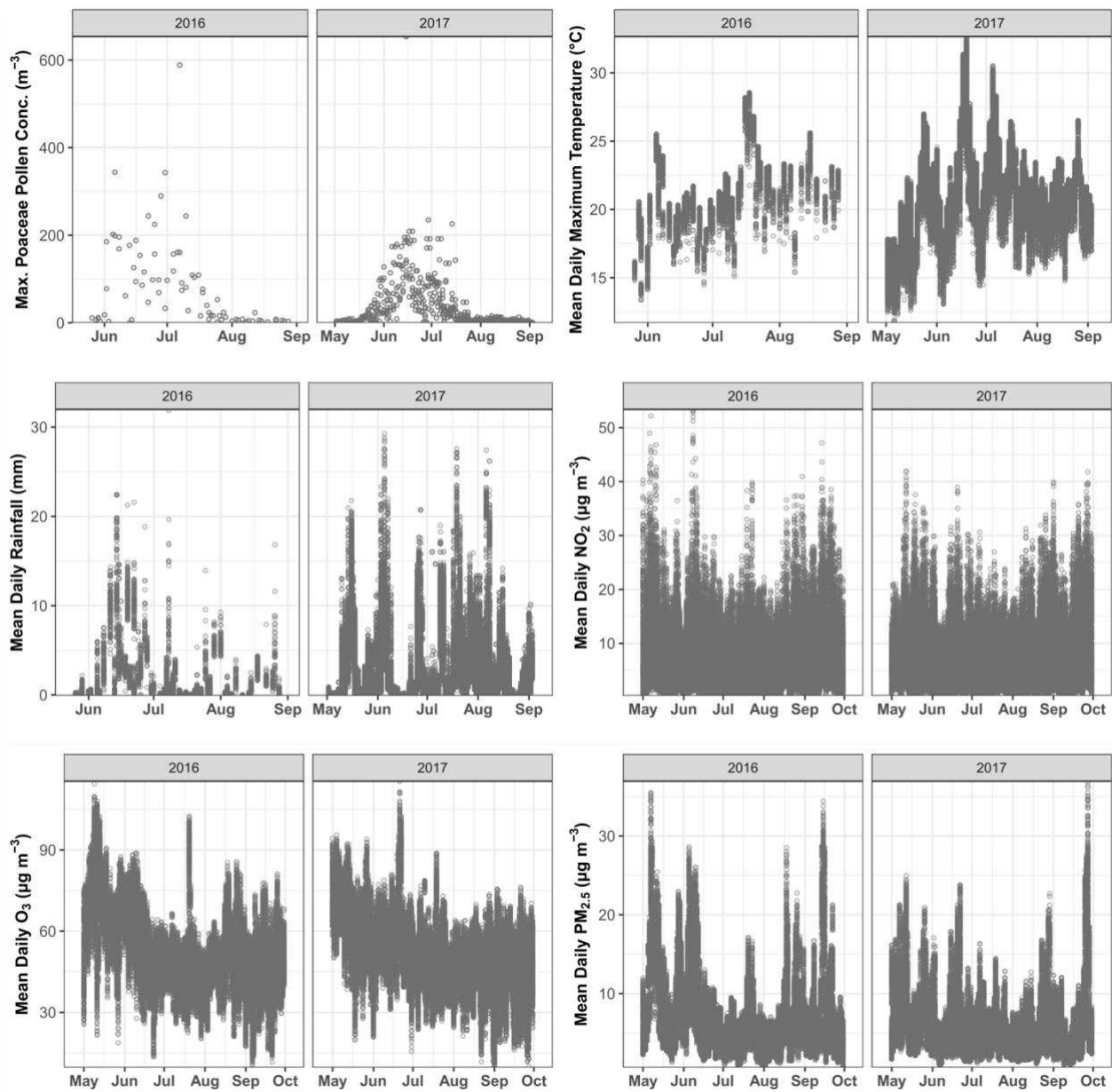
Figure S4 Time series of major environmental covariates during monitoring periods. Related to Figures 1-4 and STAR Methods. Major environmental covariates used in GAMs. Values correspond to the one to four-day sample pools used in the models (i.e. individual values for each station/location).

Supplemental References

S1.   Guan, X., Yuyama, N., Stewart, A., Ding, C., Xu, N., Kiyoshi, T., and Cai, H. (2017). Genetic diversity and structure of *Lolium* species surveyed on nuclear simple sequence repeat and cytoplasmic markers. Front. Plant Sci. *8*, 1–9.

S2.   Cope, C., and Gray, A. (2009). Grasses of the British Isles (Botanical Society of Britain and Ireland).