Appendix I. Complementary description of the design for sampling seed deposition by birds.

Figure I.1. Distribution of 125 cells selected for sampling of seed rain in the study plots in different study years (dots indicate the centroids of the selected cells).

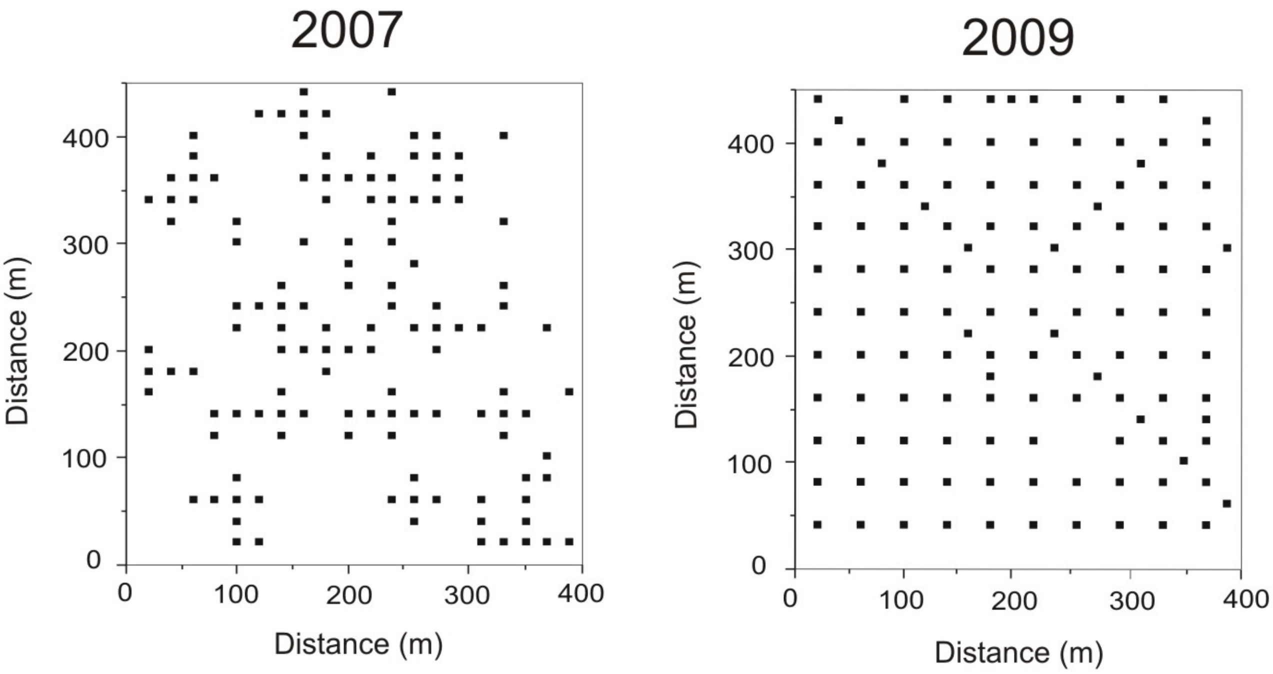


Table I.1. Descriptive statistics of the spatial coordinates (X,Y) of the centroids of the 125 cells selected for sampling of seed rain in the study plots in different study years, and the value of forest cover represented by each set of cells. The values of F and P corresponding to one-way ANOVAs comparing average values between years are also shown.

		2007	2009	F	P
Coordinate X	Mean±SE	187.5±9.1	186.7±10.3	0.01	0.95
	Range	380	380		
	CV (%)	54.2	60.8		
Coordinate Y	Mean±SE	202.7±10.9	222.1±11.1	1.53	0.22
	Range	420	400		
	CV (%)	59.3	57.2		
Forest cover (%)	Mean±SE	29.7±3.1	26.2±3.1	0.66	0.42
	Range	100	100		
	CV (%)	116.3	130.5		

Appendix II. Analysis of Principal Components of frugivore diet.

We used a Principal Component Analysis in order to search for major trends of variability between bird species and years in the composition of the diet. PCA was conducted on the proportions of fruits of *C. monogyna*, *I. aquifolium* and *T. baccata* consumed by the different bird species in different years. Proportions were calculated with respect to the total number of fruits consumptions per bird species per year (N = 16 cases combining different species and years in which consumption data were available; Table II.1) and arcsin-square root transformed prior to analysis.

PCA extracted two components that accounted for 99% of global variance in original variables. The first component (PC1) represented a gradient of increasing proportion of *C. monogyna* and decreasing proportion of *I. aquifolium* in the diet, whereas the second component (PC2) was related to increasing proportion of *T. baccata* (Table II.2). Rotated factor scores were calculated for each combination of bird species and year (Figure II.1). These factor scores were used to compare diet composition between species and years by means of two-ways ANOVA models with species and year as predictor variables and PC1 and PC2 scores as response variables (no interaction term was considered as no data from all years were available for all species).

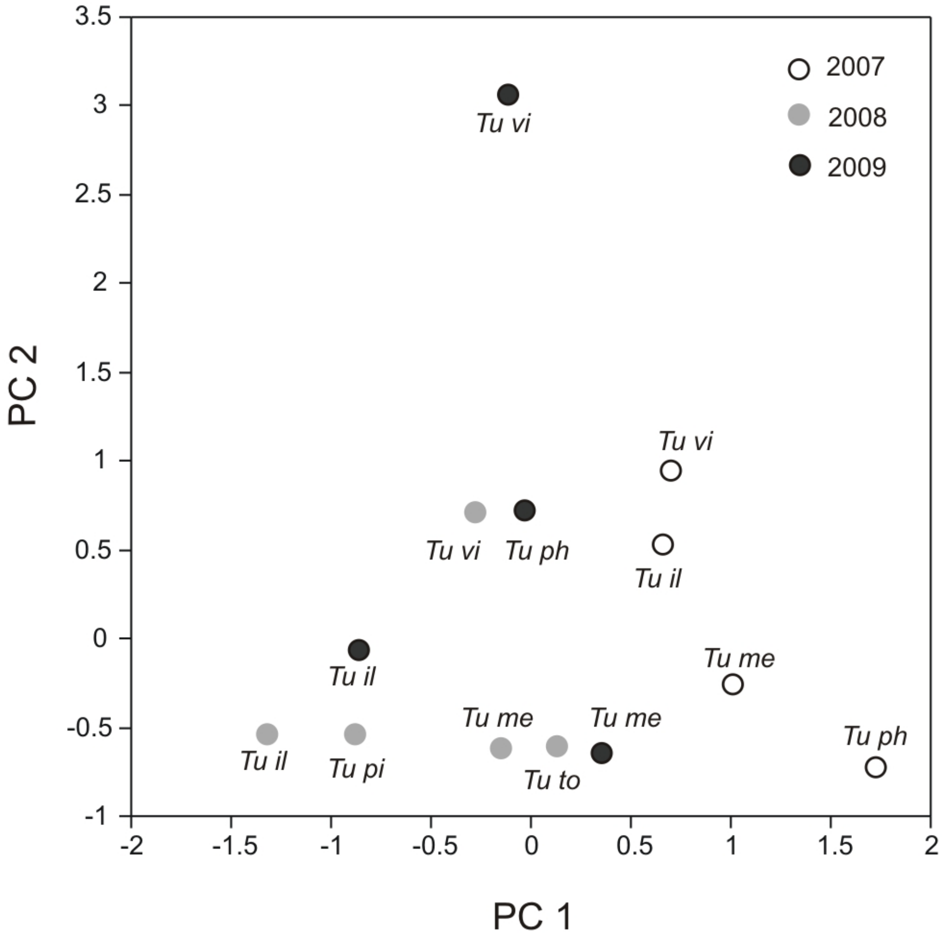
Table II.1. Number of fruits of tree species consumed by birds (*Turdus* spp.) in different years. Observations of fruit consumption were recorded in foraging sequences of individual birds.

Bird species	Year	*Crataegus monogyna*	*Ilex aquifolium*	*Taxus baccata*
T. iliacus	2007	162	37	31
T. iliacus	2008	0	125	0
T. iliacus	2009	7	116	3
T. merula	2007	433	56	10
T. merula	2008	65	144	0
T. merula	2009	108	82	0
T. philomelos	2007	72	0	0
T. philomelos	2008	0	7	0
T. philomelos	2009	17	21	8
T. pilaris	2008	2	41	0
T. pilaris	2009	16	0	0
T. torquatus	2008	10	12	0
T. torquatus	2009	0	6	0
T. viscivorus	2007	54	6	18
T. viscivorus	2008	28	73	20
T. viscivorus	2009	11	5	68

Table II.2. Results of Principal Component Analysis constructed on the proportions of fruits from different species consumed by different bird species in different years.

Factor	**Eigenvalue**	**% Variance**
PC1	1.97	65.63
PC2	1.02	33.12
Eigenvectors		
Prop. of fruits consumed	PC1	PC2
Crataegus monogyna	0.65	-0.39
Ilex aquifolium	-0.71	-0.02
Taxus baccata	0.26	0.91
Standardized Score Coefficients		
Prop. of fruits consumed	PC1	PC2
Crataegus monogyna	0.56	-0.23
Ilex aquifolium	-0.47	-0.17
Taxus baccata	-0.09	0.92

Figure II.1. Values of rotated factor scores extracted from PCA corresponding to different bird species and different years (Tu il: *Turdus iliacus*; Tu me: *T. merula*; Tu ph: *T. philomelos*; Tu pi: *T. pilaris*; Tu to: *T. torquatus*; Tu vi: *T. viscivorus*).



Appendix III. Complementary description on Spatial Analysis by Distance Indices (SADIE).

Spatial Analysis by Distance Indices (SADIE; Perry 1995; Perry et al. 1999; Perry et al. 2002) was used to characterize and quantify the degree of spatial aggregation (patchiness) of the abundances of fleshy fruits of the different tree species, the abundances of different species of thrushes and the abundance of dispersed seeds, in the study plots and for the different study years. SADIE describes the spatial structure of ecological data sampled in the form of spatially geo-referenced counts, seeking to identify those areas where patches of high- or low density cluster.

In our case, we considered plot cells as sampling points, refereed in space by the x,y coordinates of the corresponding cell centroids. Based on estimates of distance to regularity (i.e. the difference between the true count value in a given point and a count value assuming a regular distribution of all counts across sampling points), SADIE provides an aggregation index (*Ia*) to measure the degree of overall spatial clumpiness across the whole extent. *Ia* represents random (*Ia* = 1), regular (*Ia* < 1) or aggregated (*Ia* > 1) distribution patterns, and its degree of significance is checked by means of a randomization procedure based on rearrangements of the observed counts amongst the sample units.

SADIE also provides a point-level parameter, the clustering index (υ), which quantifies the degree to which the count at a given point contributes to the overall clumpiness. These clustering indexes may be considered weighted continuous variables that depict the spatial distribution of the raw count data. Clustering vectors from different variables sampled in the same points represent normalized variables that may be related among them, by means of correlation or regression analyses, to verify the existence of significant spatial match between variables. Clustering index vectors are usually highly auto-correlated in space, and thus analyses relating vectors from different variables must account for the potential effects of spatial autocorrelation in the determination of correlation strength.

References

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