

Supplementary material

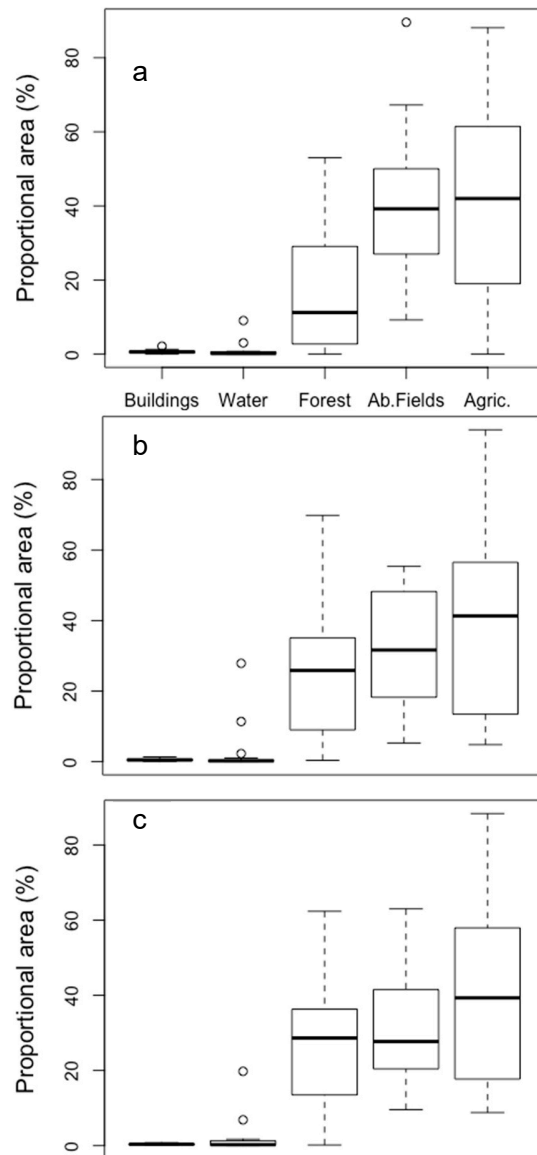


Figure S1. Boxplots showing the proportional area of different land cover types sampled within a) 500 m, b) 1000 m, and c) 2000 m radii in the landscape surrounding highbush blueberry fields. Lines across each box represents the median (N= 18).

Table S1. Geographic coordinates, area, and shrub density of the 18 commercial highbush blueberry fields where wild bees were sampled in Montérégie, Canada.

Field Name	Geographic coordinates (DD)	Field Area (ha)	No. of shrub	Shrub density (1/ha)
Charbonneau	45.681094N; 73.2964W	1.25	3600	2880.00
Bleuesime	45.216417N; 73.260533W	0.8	1200	1500.00
Sylvie Remillard	45.023469N; 73.929875W	3.1	5000	1612.90
Alain Menard	45.079583N; 72.879433W	2	4000	2000.00
Bleuets du ridge	45.113644N; 72.920956W	0.8	6500	8125.00
La colline au bleuets	45.173981N; 72.716811W	1.2	1700	1416.67
Les delisles	45.25435N; 72.73265W	2.5	4300	1720.00
Bleuetiere du boise	45.356933N; 72.75925W	2.2	4000	1818.18
Bleuetiere Giard	45.428633N; 72.69825W	1	5000	5000.00
Joualbleu	45.7829N; 73.00185W	3	3000	1000.00
Machabee	45.057933N; 73.887733W	14	9000	642.86
Aux dames bleuets	45.98725N; 72.895217W	0.5	2250	4500.00
Bleu ciel	45.573067N; 72.906933W	2	4200	2100.00
Ferme equinoxe	45.527908N; 72.897864W	2.3	3700	1608.70
Reve Bleu	45.508433N; 72.963283W	7	12500	1785.71
Domaine du flanc sud	45.532483N; 73.169617W	3	5700	1900.00
Jutras	45.325639N; 73.09513W	10	8000	800.00
Sur le Champs	45.331317N; 73.063272W	3	3000	1000.00

Table S2. Generalized linear models for visual data showing the relationships of wild bee flower visit and visiting richness as a function of different factors at the 2000 m, 1000 m, and 500 m scales. The Akaike Information Criterion for small samples (AICc) and the Nagelkerke's ratio adjusted pseudo- R^2 (adj. R^2) from the regression models are presented. Models are sorted according to their AICc. K represents the number of parameters in the model. Forest, in bold font, is the main factor to be tested whereas covariates, in normal font, correspond to potentially confounding factors. Models for flower visits are Negative Binomial regressions. Models for richness are Poisson regressions.

Radius (m)		Bee Flower Visit			Visiting Richness			
2000	Model	K	AICc	adj- R^2	Model	K	AICc	adj- R^2
	Forest	3	162.392	0.385	Plant Density	2	70.284	0.178
	Leaf Temperature	3	165.266	0.193	Forest	2	70.543	0.141
	Forest + Leaf Temperature	4	165.670	0.391	Abandoned Fields	2	71.266	0.035
	Forest + Abandoned Fields	4	165.690	0.389	Leaf Temperature	2	71.480	0.003
	Forest + Plant density	4	165.723	0.387	Forest + Plant Density	3	72.367	0.294
	Abandoned Fields	3	167.725	0.001	Abandoned Fields + Plant Density	3	72.977	0.209
	Plant Density	3	167.737	0.000	Forest + Leaf Temperature	3	73.189	0.180
	Abandoned Fields + Leaf Temperature	4	168.586	0.196	Leaf Temperature + Plant Density	3	73.198	0.178
	Leaf Temperature + Plant Density	4	168.594	0.196	Forest + Abandoned Field	3	73.359	0.155
	Abandoned Fields + Plant Density	4	171.088	0.001	Abandoned Fields + Leaf Temperature	3	74.177	0.035
1000								
	Forest	3	161.980	0.411	Plant Density	2	70.284	0.178
	Forest + Leaf Temperature	4	165.232	0.417	Forest	2	71.044	0.068
	Leaf Temperature	3	165.266	0.193	Abandoned Fields	2	71.221	0.042
	Forest + Plant density	4	165.314	0.412	Leaf Temperature	2	71.480	0.003
	Forest + Abandoned Fields	4	165.340	0.411	Abandoned Fields + Plant Density	3	72.806	0.233
	Abandoned Fields	3	167.717	0.002	Forest + Plant Density	3	72.813	0.232
	Plant Density	3	167.737	0.000	Leaf Temperature + Plant Density	3	73.198	0.178
	Abandoned Fields + Leaf Temperature	4	168.592	0.196	Forest + Abandoned Fields	3	73.829	0.087
	Leaf Temperature + Plant Density	4	168.594	0.196	Forest + Leaf Temperature	3	73.875	0.080

Abandoned Fields + Plant Density	4	171.079	0.002	Abandoned Fields + Leaf Temperature	3	74.136	0.042
500							
Leaf Temperature	3	165.266	0.193	Plant Density	2	70.284	0.178
Forest	3	166.106	0.131	Forest	2	71.248	0.038
Abandoned Fields	3	167.265	0.039	Abandoned Fields	2	71.307	0.029
Abandoned Fields + Leaf Temperature	4	167.607	0.265	Leaf Temperature	2	71.480	0.003
Plant Density	3	167.737	0.000	Abandoned Fields + Plant Density	3	72.680	0.251
Forest + Leaf Temperature	4	168.361	0.213	Forest + Plant Density	3	72.989	0.208
Leaf Temperature + Plant Density	4	168.594	0.196	Leaf Temperature + Plant Density	3	73.198	0.178
Forest + Abandoned Fields	4	168.914	0.172	Forest + Abandoned Fields	3	73.961	0.068
Forest + Plant density	4	169.448	0.132	Forest + Leaf Temperature	3	73.969	0.067
Abandoned Fields + Plant Density	4	170.588	0.042	Abandoned Fields + Leaf Temperature	3	74.213	0.030

Table S3. Generalized linear models for pan traps data showing the relationships of wild bee trapped abundance and trapped richness as a function of different factors at the 2000 m, 1000 m, and 500 m scales. The Akaike Information Criterion for small samples (AICc) and the Nagelkerke's ratio adjusted pseudo-R² (adj. R²) from the regression models are presented. Models are sorted according to their AICc. K represents the number of parameters in the model. Forest, in bold font, is the main factor to be tested whereas covariates, in normal font, correspond to potentially confounding factors. Models for trapped abundance and trapped richness are Negative Binomial regressions.

Radius (m)	Trapped Abundance				Trapped Richness			
2000	Model	K	AICc	adj-R ²	Model	K	AICc	adj-R ²
	Forest	3	90.261	0.390	Forest	3	83.726	0.246
	Forest + Abandoned Fields	4	92.020	0.484	Abandoned Fields	3	84.528	0.185
	Forest + Plant density	4	93.083	0.422	Forest + Abandoned Fields	4	84.857	0.393
	Forest + Leaf Temperature	4	93.618	0.390	Leaf Temperature	3	86.155	0.062
	Abandoned Fields	3	93.906	0.132	Forest + Plant density	4	86.503	0.285
	Leaf Temperature	3	94.734	0.068	Plant Density	3	86.597	0.026
	Plant Density	3	95.348	0.018	Forest + Leaf Temperature	4	87.087	0.246
	Abandoned Fields + Leaf Temperature	4	96.981	0.154	Abandoned Fields + Plant Density	4	87.336	0.224
	Abandoned Fields + Plant Density	4	97.023	0.151	Abandoned Fields + Leaf Temperature	4	87.680	0.201
	Leaf Temperature + Plant Density	4	97.796	0.092	Leaf Temperature + Plant Density	4	89.024	0.101
1000								
	Abandoned Fields	3	89.882	0.403	Abandoned Fields	3	81.221	0.400
	Forest + Abandoned Fields	4	91.559	0.506	Forest + Abandoned Fields	4	83.844	0.449
	Forest	3	91.923	0.277	Abandoned Fields + Plant Density	4	84.312	0.415
	Abandoned Fields + Plant Density	4	93.185	0.406	Abandoned Fields + Leaf Temperature	4	84.582	0.401
	Abandoned Fields + Leaf Temperature	4	93.242	0.403	Forest	3	84.661	0.176
	Forest + Plant density	4	94.707	0.315	Leaf Temperature	3	86.155	0.062
	Leaf Temperature	3	94.734	0.068	Plant Density	3	86.597	0.026
	Forest + Leaf Temperature	4	95.154	0.286	Forest + Plant density	4	87.334	0.225
	Plant Density	3	95.348	0.018	Forest + Leaf Temperature	4	87.911	0.185

	Leaf Temperature + Plant Density	4	97.796	0.092	Leaf Temperature + Plant Density	4	89.024	0.101
500								
	Abandoned Fields	3	88.835	0.462	Abandoned Fields	3	79.614	0.488
	Abandoned Fields + Leaf Temperature	4	91.574	0.499	Abandoned Fields + Leaf Temperature	4	82.427	0.519
	Abandoned Fields + Plant Density	4	92.163	0.464	Forest + Abandoned Fields	4	82.928	0.489
	Forest + Abandoned Fields	4	92.192	0.462	Abandoned Fields + Plant Density	4	82.972	0.488
	Leaf Temperature	3	94.734	0.068	Leaf Temperature	3	86.155	0.062
	Plant Density	3	95.348	0.018	Plant Density	3	86.597	0.026
	Forest	3	95.495	0.006	Forest	3	86.913	0.000
	Leaf Temperature + Plant Density	4	97.796	0.092	Leaf Temperature + Plant Density	4	89.024	0.101
	Forest + Leaf Temperature	4	98.078	0.070	Forest + Leaf Temperature	4	89.474	0.065
	Forest + Plant density	4	98.603	0.027	Forest + Plant density	4	89.944	0.027

Table S4. Hurdle models for pan traps data showing the relationships of truncated trapped abundance and trapped richness of wild bees as a function of different factors at the 2000 m, 1000 m, and 500 m scales. The Akaike Information Criterion for small samples (AICc) and the Nagelkerke's ratio adjusted pseudo- R^2 (adj. R^2) from the regression models are presented. Models are sorted according to their AICc. K represents the number of parameters in the model. Forest, in bold font, is the main factor to be tested whereas covariates, in normal font, correspond to potentially confounding factors. All models represent truncated Negative Binomial regressions.

Radius (m)		Trapped Abundance			Trapped Richness			
2000	Model	K	AICc	adj- R^2	Model	K	AICc	adj- R^2
	Forest	5	89.470	0.916	Forest	5	84.740	0.713
	Forest + Abandoned Fields	7	96.780	0.831	Abandoned Fields	5	91.430	0.565
	Forest + Plant density	7	96.950	0.929	Leaf Temperature	5	91.570	0.229
	Forest + Leaf Temperature	7	99.400	0.918	Forest + Abandoned Fields	7	91.600	0.628
	Leaf Temperature	5	100.430	0.533	Forest + Plant density	7	92.060	0.753
	Abandoned Fields	5	100.670	0.690	Plant Density	5	93.340	0.088
	Plant Density	5	102.350	0.195	Forest + Leaf Temperature	7	94.520	0.726
	Abandoned Fields + Leaf Temperature	7	108.540	0.691	Abandoned Fields + Leaf Temperature	7	99.530	0.518
	Leaf Temperature + Plant Density	7	109.870	0.656	Abandoned Fields + Plant Density	7	100.340	0.579
	Abandoned Fields + Plant Density	7	110.250	0.673	Leaf Temperature + Plant Density	7	100.430	0.432
1000								
	Forest	5	91.940	0.929	Forest	5	85.260	0.735
	Abandoned Fields	5	97.160	0.877	Abandoned Fields	5	88.450	0.725
	Forest + Abandoned Fields	7	98.450	0.852	Leaf Temperature	5	91.570	0.229
	Forest + Plant density	7	99.270	0.953	Forest + Abandoned Fields	7	91.850	0.671
	Leaf Temperature	5	100.430	0.533	Forest + Plant density	7	92.030	0.816
	Forest + Leaf Temperature	7	101.280	0.948	Plant Density	5	93.340	0.088
	Plant Density	5	102.350	0.195	Forest + Leaf Temperature	7	94.740	0.779
	Abandoned Fields + Leaf Temperature	7	105.730	0.883	Abandoned Fields + Leaf Temperature	7	97.100	0.717
	Abandoned Fields + Plant Density	7	107.030	0.871	Abandoned Fields + Plant Density	7	97.750	0.758

	Leaf Temperature + Plant Density	7	109.870	0.656	Leaf Temperature + Plant Density	7	100.430	0.432
500								
	Abandoned Fields	5	96.040	0.968	Abandoned Fields	5	86.900	0.875
	Leaf Temperature	5	100.430	0.533	Leaf Temperature	5	91.570	0.229
	Forest	5	101.550	0.268	Forest	5	93.130	-0.097
	Plant Density	5	102.350	0.195	Plant Density	5	93.340	0.088
	Abandoned Fields + Leaf Temperature	7	103.690	0.968	Abandoned Fields + Leaf Temperature	7	94.730	0.879
	Forest + Abandoned Fields	7	105.150	0.947	Forest + Abandoned Fields	7	96.160	0.842
	Abandoned Fields + Plant Density	7	105.800	0.964	Abandoned Fields + Plant Density	7	96.370	0.871
	Forest + Leaf Temperature	7	109.610	0.814	Leaf Temperature + Plant Density	7	100.430	0.432
	Leaf Temperature + Plant Density	7	109.870	0.656	Forest + Leaf Temperature	7	101.330	0.254
	Forest + Plant density	7	110.990	0.601	Forest + Plant density	7	102.130	0.326

Table S5. Hurdle models for pan trap data showing the relationship of trapped abundance of wild bees as a function of different factors at 2000 m, 1000 m, and 500 m radii. Incidence Rate Ratios (IRR) and their 95% Confidence Intervals are presented for each variable in the models. Forest, in bold font, is the main factor to be tested whereas Covariate corresponds to potentially confounding factors. The count part is based on truncated Negative Binomial models. The zero part is based on a binary logit model. Statistically significant effects are shown in bold.

Count models		Forest		Covariate	
Radius (m)	Model	IRR	95% CI	IRR	95% CI
2000					
	Forest	1.055	1.030 – 1.081		
	Forest + Abandoned Fields	1.057	1.030 – 1.084	1.012	0.983 – 1.043
	Forest + Temperature	1.054	1.028 – 1.081	0.961	0.789 – 1.171
	Forest + Shrub Density	1.055	1.033 – 1.077	0.998	0.997 – 100
1000					
	Forest	1.051	1.023 – 1.081		
	Forest + Abandoned Fields	1.047	1.017 – 1.079	1.013	0.971 – 1.057
	Forest + Temperature	1.048	1.020 – 1.077	0.904	0.725 – 1.128
	Forest + Shrub Density	1.053	1.027 – 1.079	0.998	0.996 – 100
500					
	Forest	1.021	0.973 – 1.072		
	Forest + Abandoned Fields	1.012	0.970 – 1.056	1.041	0.989 – 1.095
	Forest + Temperature	1.021	0.971 – 1.073	0.794	0.578 – 1.091
	Forest + Shrub Density	1.025	0.976 – 1.076	0.998	0.994 – 1.002
Zero models					
2000					
	Forest	0.985	0.928 – 1.046		
	Forest + Abandoned Fields	0.976	0.917 – 1.037	1.068	0.969 – 1.177
	Forest + Temperature	0.992	0.922 – 1.066	1.109	0.604 – 2.036
	Forest + Shrub Density	0.985	0.928 – 1.045	1.001	0.995 – 1.007
1000					
	Forest	0.979	0.925 – 1.035		
	Forest + Abandoned Fields	0.964	0.903 – 1.029	1.071	0.986 – 1.163
	Forest + Temperature	0.982	0.919 – 1.049	1.053	0.574 – 1.932
	Forest + Shrub Density	0.978	0.925 – 1.035	1.001	0.995 – 1.007
500					
	Forest	0.978	0.924 – 1.036		
	Forest + Abandoned Fields	0.973	0.916 – 1.034	1.063	0.983 – 1.149
	Forest + Temperature	0.981	0.917 – 1.050	1.056	0.576 – 1.937
	Forest + Shrub Density	0.978	0.924 – 1.036	1.000	0.994 – 1.007

Table S6. Hurdle models for pan trap data showing the relationship of trapped richness of wild bees as a function of different factors at 2000 m, 1000 m, and 500 m radii. Incidence Rate Ratios (IRR) and their 95% Confidence Intervals are presented for each variable in the models. Forest, in bold font, is the main factor to be tested whereas Covariate corresponds to potentially confounding factors. The count part is based on Negative Binomial models. The zero part is based on a binary logit model. Statistically significant effects are shown in bold.

Count models		Forest		Covariate	
Radius (m)	Model	IRR	95% CI	IRR	95% CI
2000					
	Forest	1.041	1.018 – 1.065		
	Forest + Abandoned Fields	1.044	1.019 – 1.069	1.014	0.988 – 1.042
	Forest + Temperature	1.040	1.016 – 1.064	0.948	0.786 – 1.142
	Forest + Shrub Density	1.042	1.021 – 1.062	0.998	0.996 – 1.000
1000					
	Forest	1.040	1.016 – 1.064		
	Forest + Abandoned Fields	1.037	1.01 – 1.064	1.010	0.974 – 1.048
	Forest + Temperature	1.037	1.012 – 1.062	0.919	0.749 – 1.127
	Forest + Shrub Density	1.042	1.02 – 1.063	0.998	0.996 – 1.000
500					
	Forest	1.013	0.973 – 1.054		
	Forest + Abandoned Fields	1.007	0.973 – 1.042	1.032	0.993 – 1.073
	Forest + Temperature	1.007	0.969 – 1.046	0.826	0.63 – 1.082
	Forest + Shrub Density	1.019	0.975 – 1.065	0.998	0.993 – 1.002
Zero models					
2000					
	Forest	0.985	0.928 – 1.046		
	Forest + Abandoned Fields	0.976	0.917 – 1.037	1.068	0.969 – 1.177
	Forest + Temperature	0.992	0.922 – 1.066	1.109	0.604 – 2.036
	Forest + Shrub Density	0.985	0.928 – 1.045	1.001	0.995 – 1.007
1000					
	Forest	0.979	0.925 – 1.035		
	Forest + Abandoned Fields	0.964	0.903 – 1.029	1.071	0.986 – 1.163
	Forest + Temperature	0.982	0.919 – 1.049	1.053	0.574 – 1.932
	Forest + Shrub Density	0.978	0.925 – 1.035	1.001	0.995 – 1.007
500					
	Forest	0.978	0.924 – 1.036		
	Forest + Abandoned Fields	0.973	0.916 – 1.034	1.063	0.983 – 1.149
	Forest + Temperature	0.981	0.917 – 1.05	1.056	0.576 – 1.937
	Forest + Shrub Density	0.978	0.924 – 1.036	1.000	0.994 – 1.007