Supplementary materials

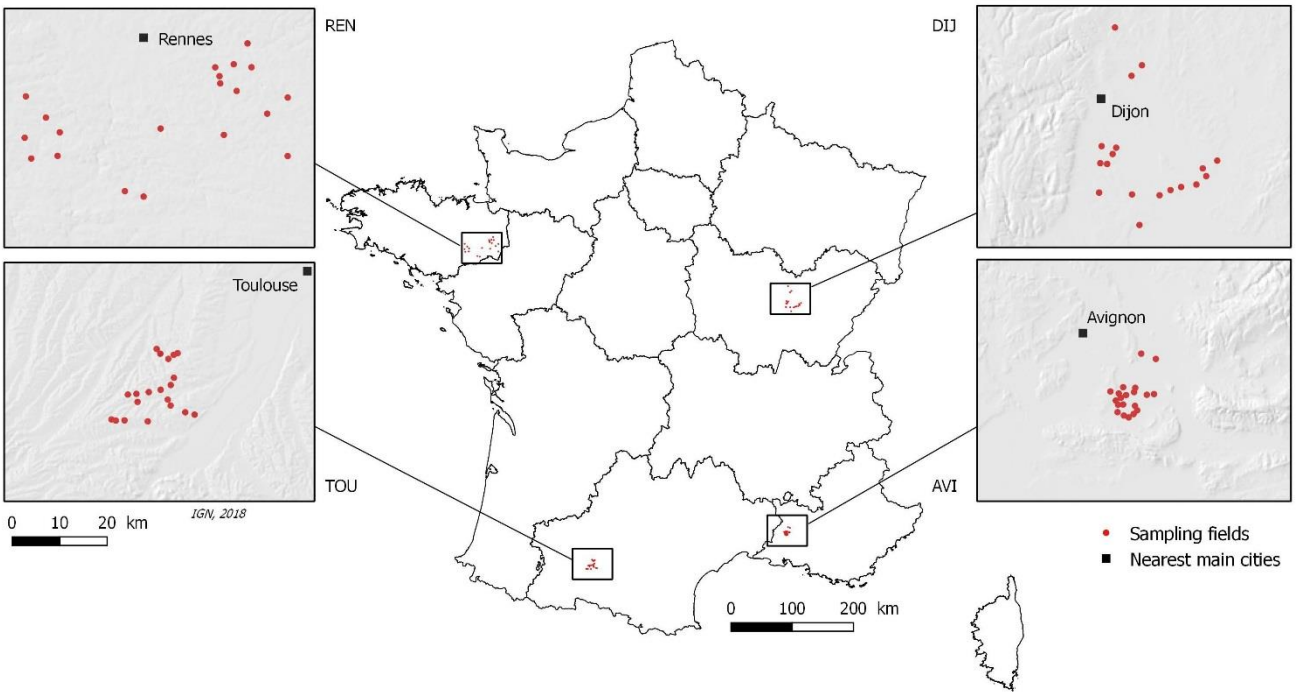

Figure S1. Location of the 80 monitored fields.

Table S1. Number of each cover type (N = 8) in sampling fields each year (N = 3) in each study area (N = 4). AVI: Avignon; DIJ: Dijon; REN: Rennes; TOU: Toulouse.

Crop type	2014				2015				2016			
	AVI	DIJ	REN	TOU	AVI	DIJ	REN	TOU	AVI	DIJ	REN	TOU
Cereal		10	20	19		15	7	3		6	11	9
Summer crop				1		2	10	7		6	4	2
Oleaginous		10				2	1	1		5	1	
Legume						1		4		3		4
Apple	20				20				20			
Grass/Legume mixture							2	2			2	
Meadow											2	3
Fallow								2				

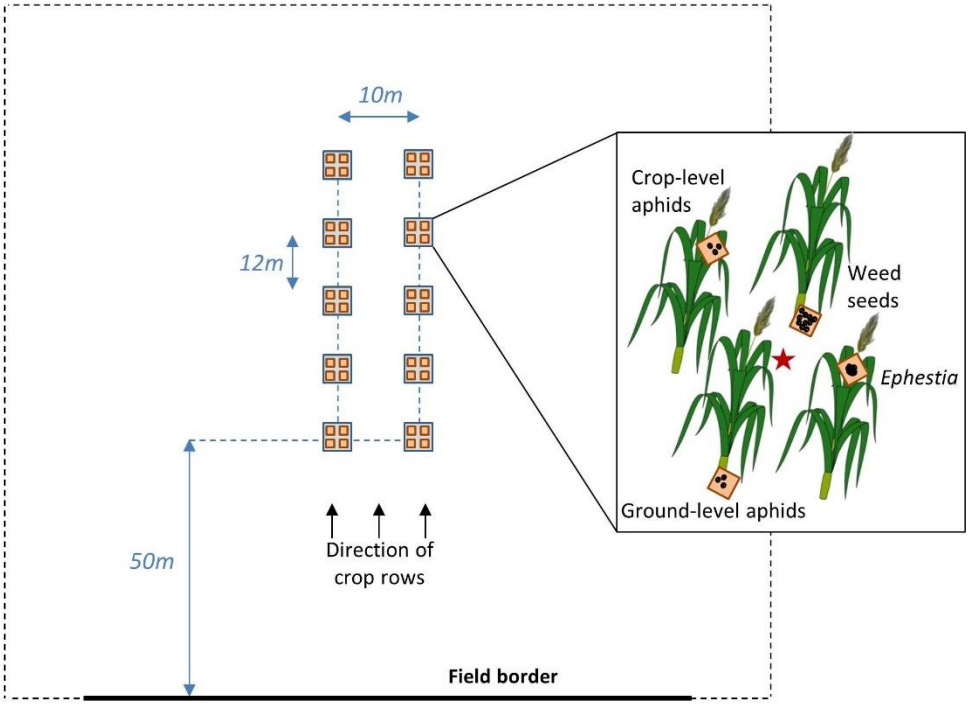

Figure S2. Schematic representation of the field monitoring design

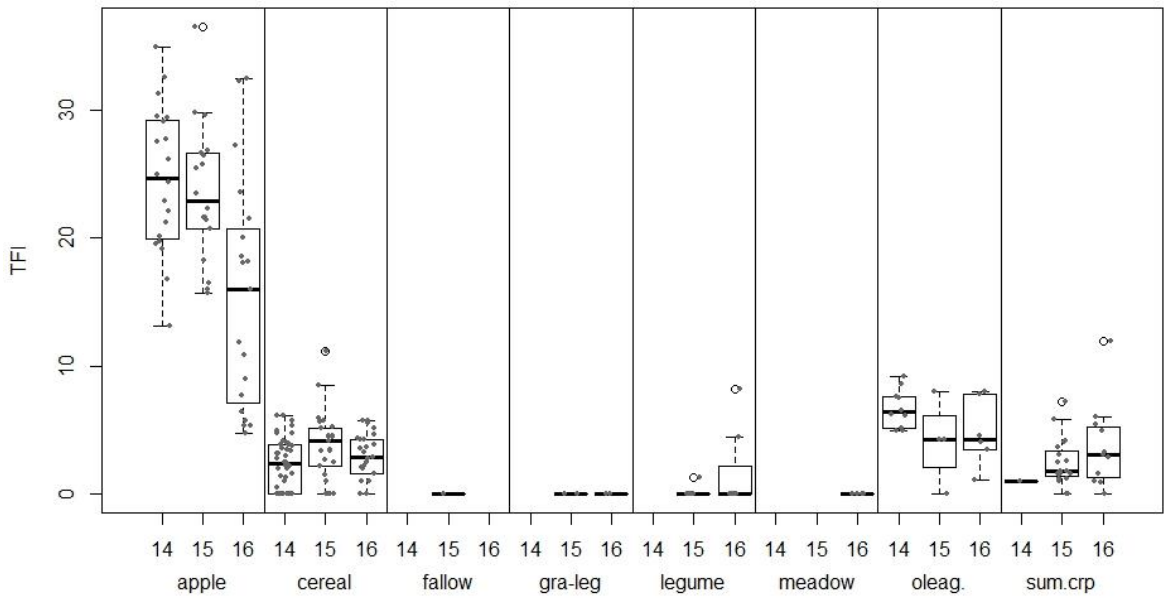

Figure S3. Variation of the Treatment Frequency Index (TFI) between the different crop types (apple, cereal, fallow, grass/legume mixture, legume, meadow, oleaginous, summer crops) each year (14: 2014; 15: 2015; 16: 2016).

Table S2. Date the two session of card installation and corresponding cumulated temperature since the January 1st.

Year	Area	Crop type	Number of fields	Date session 1	Cumulated temperature (°C)	Date session 2	Cumulated temperature (°C)
2014	AVI	Apple	20	23/04/2014	1198	11/05/2014	1495
2014	DIJ	Cereal, Oleaginous	20	14/05/2014	1131	11/06/2014	1601
2014	REN	Cereal	20	04/05/2014	1105	01/06/2014	1484
2014	TOU	Cereal, Summer crops	20	13/04/2014	987	18/05/2014	1476
2015	AVI	Apple	20	23/04/2015	1030	18/05/2015	1468
2015	DIJ	Cereal, Legume, Oleaginous	18	28/05/2015	1155	22/06/2015	1626
2015	DIJ	Summer crops	2	02/07/2015	1842	16/07/2015	2184
2015	REN	Cereal, Grass/Legume mixture, Oleaginous	10	18/05/2015	1181	15/06/2015	1590
2015	REN	Summer crops	10	15/06/2015	1590	31/08/2015	3008
2015	TOU	Cereal, Legume, Oleaginous	6	29/04/2015	1039	27/05/2015	1506
2015	TOU	Fallow, Grass/Legume mixture, Legume, Summer crops	13	03/06/2015	1643	01/07/2015	2253
2016	AVI	Apple	20	28/04/2016	1175	30/05/2016	1701
2016	DIJ	Cereal, Legume, Oleaginous	14	19/05/2016	988	09/06/2016	1315
2016	DIJ	Summer crops	6	30/06/2016	1697	21/07/2016	2131
2016	REN	Cereal, Grass/Legume mixture, Meadow, Oleaginous	16	11/05/2016	1059	09/06/2016	1484
2016	REN	Summer crops	4	09/06/2016	1484	29/08/2016	2969
2016	TOU	Cereal	9	25/04/2016	1082	23/05/2016	1476
2016	TOU	Fallow, Legume, Summer crops	9	06/06/2016	1720	04/07/2016	2274

Table S3. Number of fields effectively included in the analysis for the each type of sentinel prey cards.

Sentinel prey type	Region	Session 1			Session 2		
		2014	2015	2016	2014	2015	2016
Ephestia eggs	AVI	20	18	15	20	18	19
	DIJ	20	0	17	20	18	19
	REN	20	20	18	20	20	19
	TOU	17	17	17	17	17	14
Groud-level aphid	AVI	20	18	19	20	18	19
	DIJ	20	20	18	20	20	20
	REN	20	20	18	20	20	19
	TOU	17	17	17	17	17	17
Crop-level aphid	AVI	20	18	19	20	18	19
	DIJ	20	20	17	20	20	19
	REN	20	20	18	20	20	19
	TOU	17	17	17	17	17	17
Viola arvensis seeds	AVI	20	18	16	19	18	19
	DIJ	20	20	18	20	18	20
	REN	20	20	18	20	20	19
	TOU	17	17	17	17	17	15

Table S4. Definition of the explanatory variables

Variable name	Signification
SHDI	Shannon diversity of the landscape (7 classes [a]) in 1km² buffer
pWood	proportion of land area covered by woody elements in 1km² buffer
pMeadow	proportion of land area covered by meadows in 1km² buffer
pSNH	proportion of land area covered by semi-natural habitats in 1km² buffer
pTargetCrop	proportion of land area covered by crops similar to the crop in the monitored field in 1km² buffer
iWood	total length of the interfaces between crops and woods in 1km² buffer
iMeadow	total length of the interfaces between crops and meadows in 1km² buffer
iSNH	total length of the interfaces between crops and semi-natural habitats in 1km² buffer
TFI	Treatment Frequency Index in the focal field

[a] Classes: urban areas, woods, fallows, water, annual crops, perennial crops and meadows.

Table S5. Descriptive statistics (minimum, median and maximum) over the three years of the landscape variables at each region (raw variables).

Region	Stat	SHDI	pWood (%)	pMeadow (%)	pSNH (%)	pTargetCrop (%)	iWood (m)	iMeadow (m)	iSNH (m)
AVI	Min.	1.30	2.91	9.05	13.56	5.18	1340	2636	5622
	Med.	1.53	9.98	27.18	39.03	28.46	7758	15560	23276
	Max.	1.82	28.44	66.47	85.22	49.05	11346	30600	40496
DIJ	Min.	0.30	0.26	0.69	0.94	3.56	26	170	1074
	Med.	0.99	5.23	17.63	28.33	24.51	1708	2386	4506
	Max.	1.46	29.68	52.90	69.06	75.54	5720	6704	8830
REN	Min.	0.78	1.47	6.14	8.09	5.07	2194	938	4136
	Med.	1.11	2.97	28.27	35.00	28.63	4518	2278	7126
	Max.	1.44	16.61	55.66	61.32	50.17	9272	4728	11828
TOU	Min.	0.47	5.00	0.31	7.40	0.00	3022	30	4542
	Med.	1.09	15.84	14.44	32.18	16.29	7630	1736	9602
	Max.	1.34	22.97	48.36	71.30	77.65	13880	7130	16512

SHDI: Shannon diversity index of land cover types; pWood: proportion of land area covered by woody elements, pMeadow: proportion of land covered by meadows; pSNH: proportion of land covered by semi-natural habitats; pTargetCrop: proportion of crops similar to that of the monitored field; iWood: length of interfaces between crops and woods; iMeadow: length of interfaces between crops and meadows; iSNH: length of interfaces between crops and semi-natural habitats; Regions: AVI: Avignon; DIJ: Dijon; REN: Rennes; TOU: Toulouse.

Table S6. Spearman correlations between explanatory variables (landscape variables and TFI), normalized variables.

Variable	SHDI	pWood	pMeadow	pSNH	pTargetCrop	iWood	iMeadow	iSNH
pWood	0.42 ***							
pMeadow	0.45 ***	0.14 **						
pSNH	0.52 ***	0.49 ***	0.91 ***					
pTargetCrop	-0.10 *	-0.34 ***	-0.22 ***	-0.33 ***				
iWood	0.24 ***	0.20 ***	-0.14 **	-0.09 ns	0.06 ns			
iMeadow	0.54 ***	0.04 ns	0.29 ***	0.23 ***	0.08 ns	0.03 ns		
iSNH	0.51 ***	0.20 ***	0.02 ns	0.05 ns	0.11 *	0.75 ***	0.59 ***	
TFI	-0.04 ns	-0.06 ns	-0.06 ns	-0.09 *	0.04 ns	-0.11 *	0.12 **	0.01 ns

* $P< 0.05$; ** $P< 0.01$; *** $P< 0.001$; ns: not significant. TFI: Treatment Frequency Index; SHDI: Shannon diversity index of land cover types; pWood: proportion of land area covered by woody elements, pMeadow: proportion of land covered by meadows; pSNH: proportion of land covered by semi-natural habitats; pTargetCrop: proportion of crops similar to that of the monitored field; iWood: length of interfaces between crops and woods; iMeadow: length of interfaces between crops and meadows; iSNH: length of interfaces between crops and semi-natural habitats.

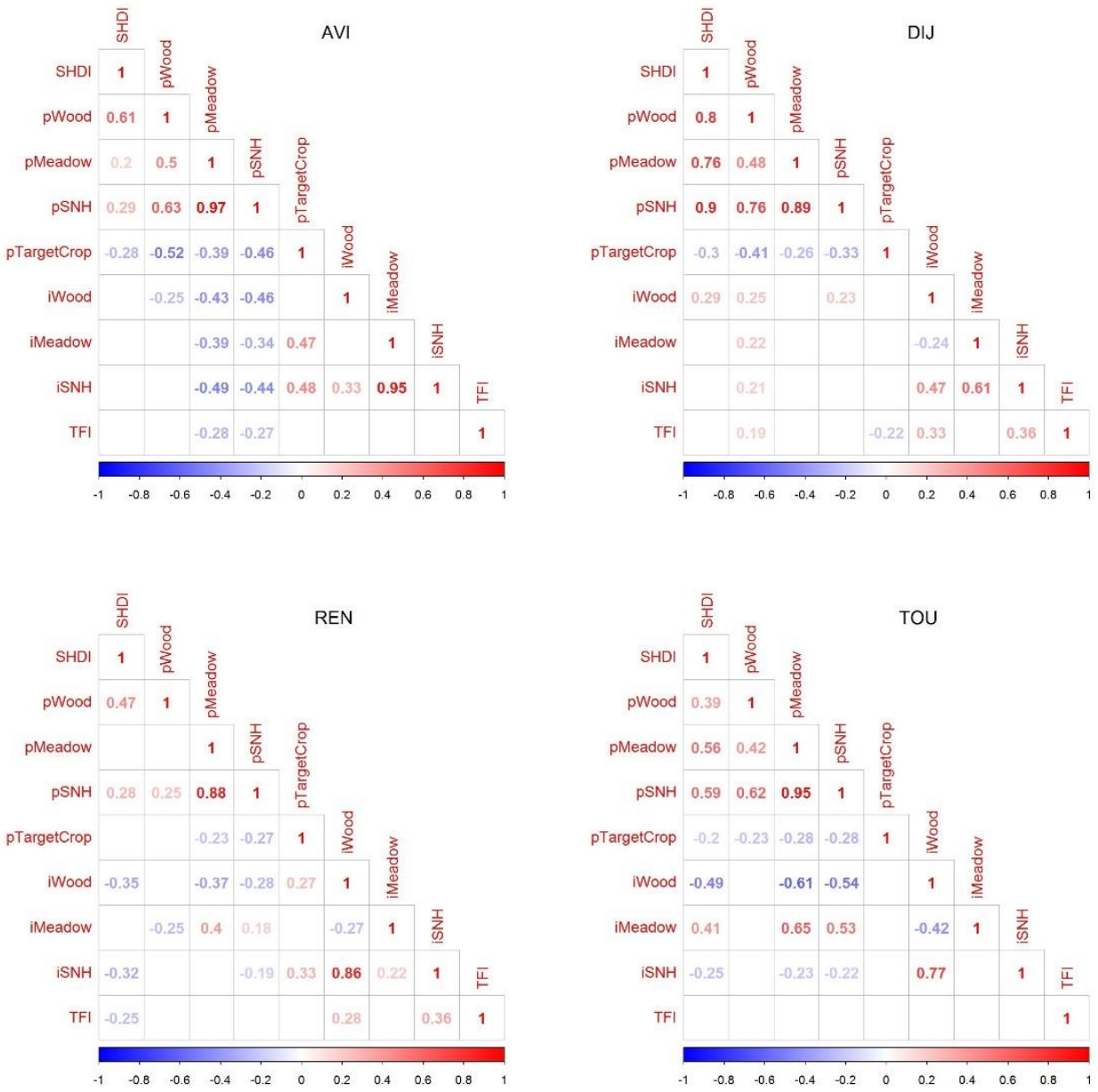

Figure S4. Spearman correlations between explanatory variables (landscape variables and TFI), normalized variables – Detail for each region

Table S7. Correlations between the meteorological variables and the first three axes of the PCA, and percentage of explained variance for each axis.

Variable	24h meteo dataset			96h meteo dataset		
	PC1	PC2	PC3	PC1	PC2	PC3
TM	-0.71	-0.67	-0.05	0.59	-0.77	0.03
TN	-0.53	-0.67	-0.32	0.50	-0.76	-0.04
TX	-0.72	-0.61	0.12	0.61	-0.73	-0.03
V	-0.51	0.53	-0.60	0.74	0.51	-0.16
VX	-0.54	0.58	-0.40	0.61	0.64	-0.33
RR	0.07	-0.49	-0.41	-0.44	-0.39	-0.70
UM	0.77	-0.38	-0.42	-0.85	-0.19	<0.01
UN	0.73	-0.18	-0.57	-0.77	-0.15	0.34
UX	0.58	-0.39	0.21	-0.67	-0.09	-0.44
% expl. var.	37.1	27.3	15.1	42.9	28.8	10.3

Relating PCA on meteorological conditions with regions, years and sessions

The PCA was used to synthetized meteorological variables that describes the conditions prevailing during the days the sentinel prey cards were exposed. The variability of this meteorological conditions partly results from differences between regions, years and sessions (Figure S5 and S6 below). To quantify the effects of these three factors on the principal components we used t-test and two-by-two least square mean comparisons.

For the 24h meteorological dataset, PC1 opposed REN region (positive values) and TOU region, and PC3 discriminated AVI region (positive values). PC1 was related with 2015 (negative values) and PC3 with 2016 (negative values). The first session was associated with the positive values of the three principal components.

For the 96h meteorological dataset, PC1 opposed REN region (negative values) and TOU region and PC3 discriminated AVI region (negative values). PC1 was related with 2016 (negative values), PC2 with 2014 (negative values) and PC3 with 2015 (positive values). Finally, the first session was associated with PC2 (positive values) and the second session with PC1 (positive values).

Only the predation rates on weed seed cards and *Ephestia* cards were significantly affected by the synthetic meteorological variables. Given the sign of effects (Table 1) and the above described relationships, these significant meteorological effects can be interpreted as partly resulting from higher predation rates of both weed seeds and *Ephestia* in REN than in TOU; and from a higher predation rate of weed seeds in 2016 than in 2014 and 2015.

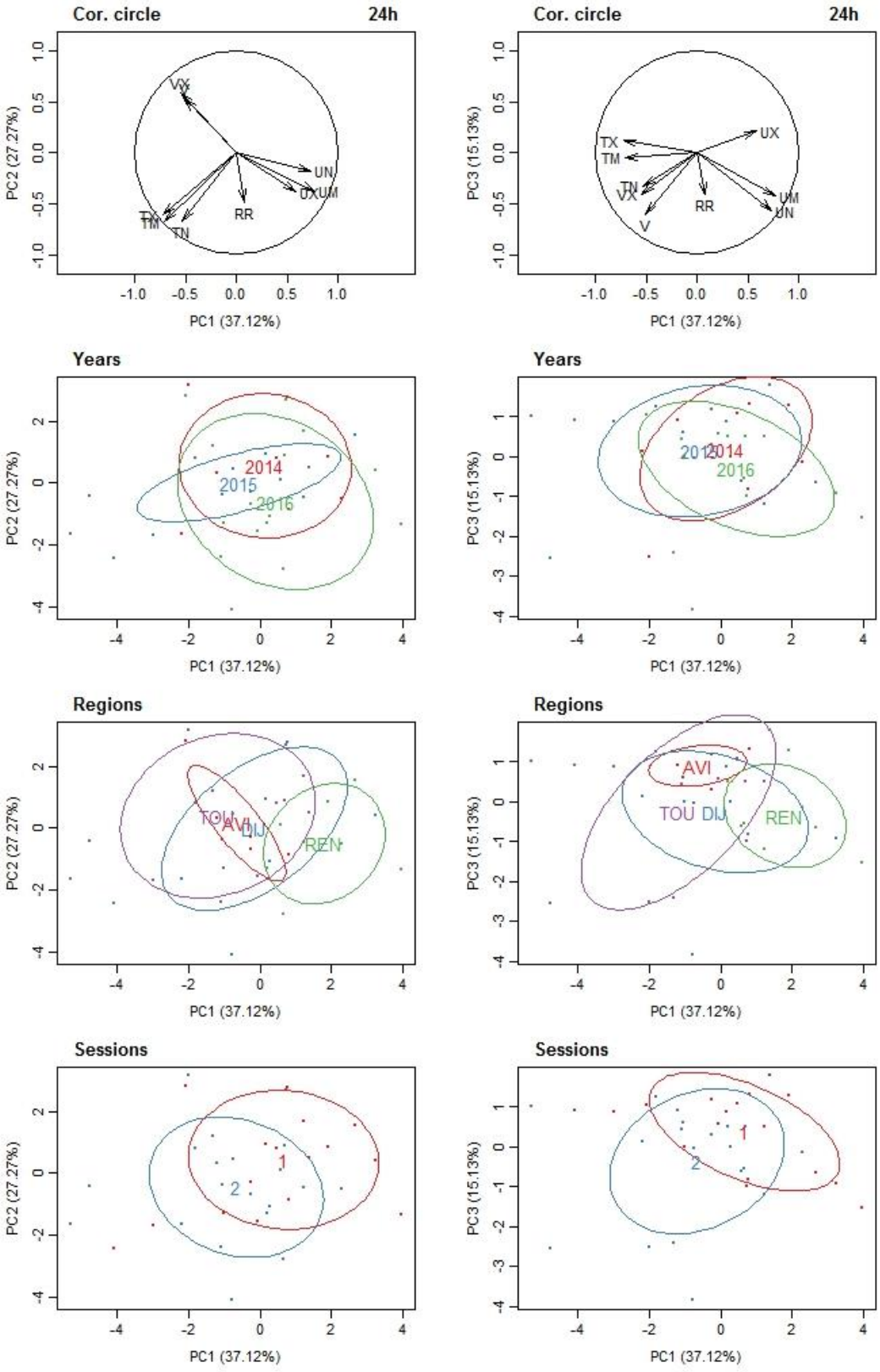

Figure S5. Variables projection on the PC1-PC2 and PC1-PC3 factorial plans and projection of the years, regions and sessions groups for the 24h meteo dataset.

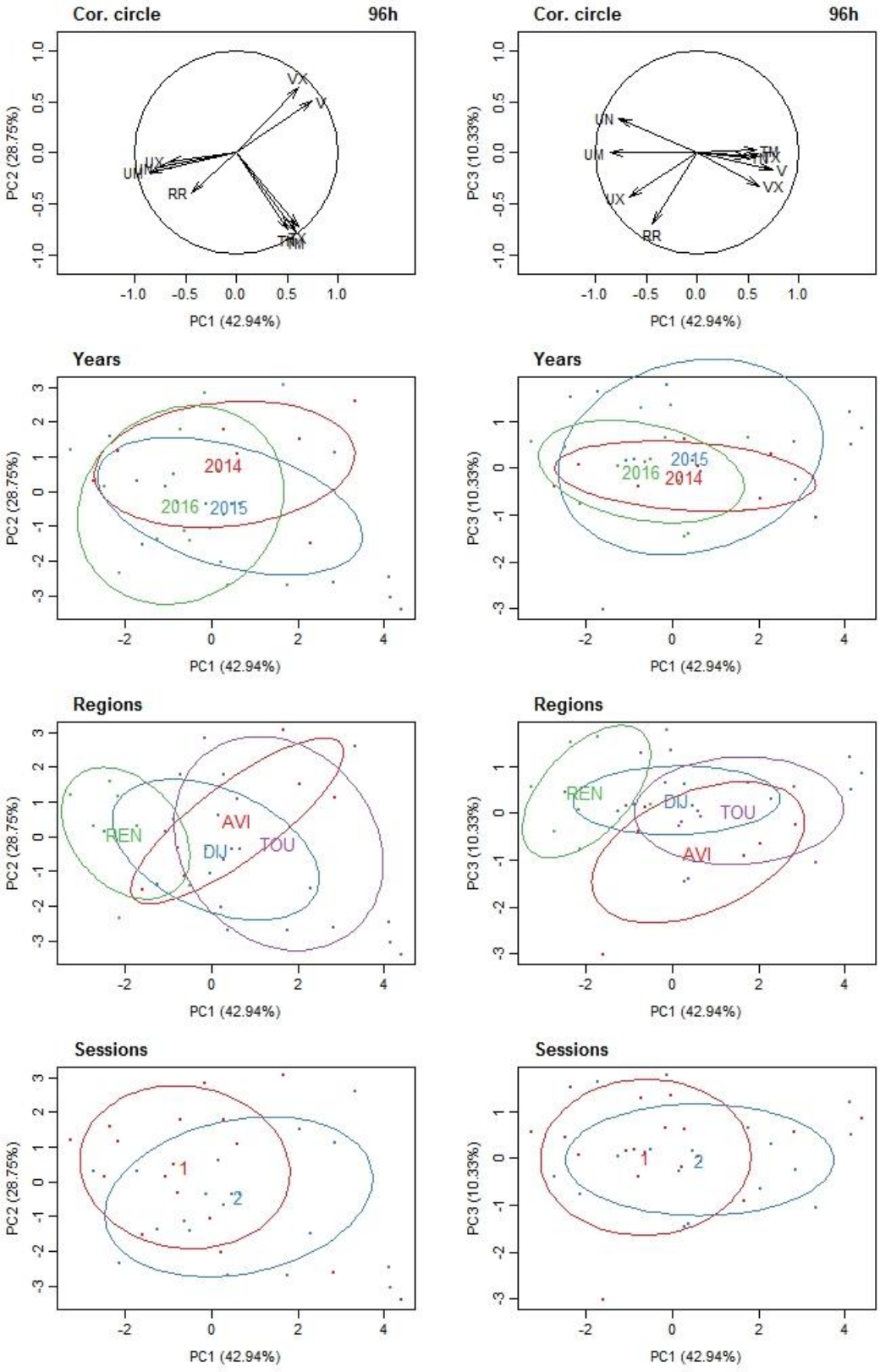

Figure S6. Variables projection on the PC1-PC2 and PC1-PC3 factorial plans and projection of the years, regions and sessions groups for the 96h meteo dataset.

Table S8. Spearman correlations between predation rates on the four types of cards.

	Ephestia	Ground-level aphid	Crop-level aphid
Ground-level aphid	0.13 **		
Crop-level aphid	0.27 ***	0.26 ***	
Weed seed	0.29 ***	0.25 ***	0.08 ns

* $P< 0.05$; ** $P< 0.01$; *** $P< 0.001$; ns: not significant

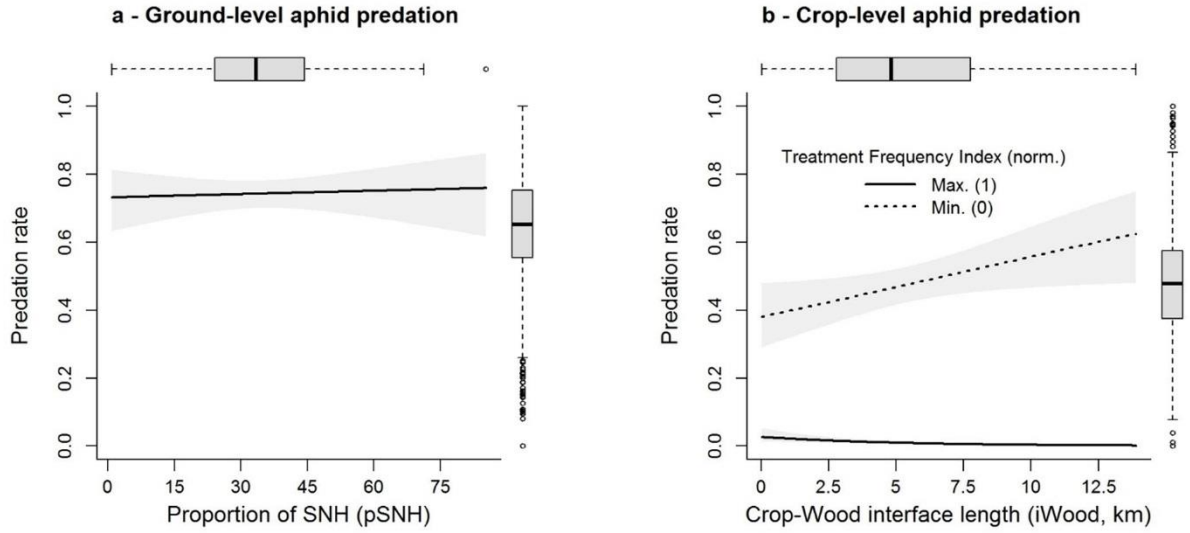

Figure S7. Partial regression or interaction graphs for the significant effects in the averaged model. Significant effect of pSNH in the case of ground-level aphid predation (a) and significant interaction between TFI and iWood in the case of crop-level aphids (b). Other significant effect are presented in Figure 2 in the main text. Shaded areas correspond to 95% confidence intervals. The boxplot at the top of each graph represents the distribution of the landscape variable; the one on the right represents the distribution of the predictions of the averaged model. Min.: minimal TFI value; Max.: maximal TFI value; TFI: Treatment Frequency Index. SHDI: Shannon diversity index of land cover types; pMeadow: proportion of meadows; pSNH: proportion of semi-natural habitats; pTargetCrop: proportion of target crop; iWood: length of interfaces between crops and woods; iMeadow: length of interfaces between crops and meadows; iSNH: length of interfaces between crops and semi-natural habitats.

Table S9. Model ranking according to their AICc value and weight of each model in the calculation of the averaged estimates.

Sentinel card type	Model	df	logLik	AICc	delta	weight
Weed seed	CropType+PC1+PC2+PC3+TFI+pTargetCrop+TFI*pTargetCrop	17	-1904.72	3844.88	0.00	0.813
	CropType+PC1+PC2+PC3+TFI+SHDI+TFI*SHDI	17	-1907.69	3850.82	5.94	0.042
	CropType+PC1+PC2+PC3+TFI+pMeadow+TFI*pMeadow	17	-1907.95	3851.34	6.46	0.032
	CropType+PC1+PC2+PC3+TFI+iSNH+TFI*iSNH	17	-1908.09	3851.62	6.74	0.028
	CropType+PC1+PC2+PC3+TFI+iMeadow+TFI*iMeadow	17	-1908.23	3851.90	7.02	0.024
	CropType+PC1+PC2+PC3+TFI+pWood+TFI*pWood	17	-1908.35	3852.14	7.26	0.022
	CropType+PC1+PC2+PC3	14	-1912.00	3852.98	8.10	0.014
	CropType+PC1+PC2+PC3+TFI+iWood+TFI*iWood	17	-1908.84	3853.12	8.24	0.013
	CropType+PC1+PC2+PC3+TFI+pSNH+TFI*pSNH	17	-1908.97	3853.38	8.50	0.012
Ephestia	CropType+PC1+PC2+PC3+TFI+pTargetCrop+TFI*pTargetCrop	17	-743.21	1521.83	0.00	0.982
	CropType+PC1+PC2+PC3	14	-751.31	1531.57	9.74	0.008
	CropType+PC1+PC2+PC3+TFI+iWood+TFI*iWood	17	-748.72	1532.85	11.02	0.004
	CropType+PC1+PC2+PC3+TFI+pMeadow+TFI*pMeadow	17	-749.46	1534.32	12.48	0.002
	CropType+PC1+PC2+PC3+TFI+pSNH+TFI*pSNH	17	-749.46	1534.32	12.48	0.002
	CropType+PC1+PC2+PC3+TFI+SHDI+TFI*SHDI	17	-749.66	1534.73	12.90	0.002
	CropType+PC1+PC2+PC3+TFI+pWood+TFI*pWood	17	-750.52	1536.44	14.61	0.001
	CropType+PC1+PC2+PC3+TFI+iMeadow+TFI*iMeadow	17	-750.90	1537.20	15.37	0.000
	CropType+PC1+PC2+PC3+TFI+iSNH+TFI*iSNH	17	-751.22	1537.84	16.01	0.000
Ground-level aphid	CropType+PC1+PC2+PC3+TFI+pMeadow+TFI*pMeadow	17	-1343.54	2722.49	0.00	0.208
	CropType+PC1+PC2+PC3+TFI+pTargetCrop+TFI*pTargetCrop	17	-1343.57	2722.55	0.06	0.202
	CropType+PC1+PC2+PC3+TFI+pSNH+TFI*pSNH	17	-1343.77	2722.95	0.46	0.165
	CropType+PC1+PC2+PC3+TFI+SHDI+TFI*SHDI	17	-1343.88	2723.17	0.68	0.148
	CropType+PC1+PC2+PC3+TFI+iSNH+TFI*iSNH	17	-1344.27	2723.95	1.46	0.100
	CropType+PC1+PC2+PC3+TFI+iMeadow+TFI*iMeadow	17	-1344.36	2724.13	1.64	0.092
	CropType+PC1+PC2+PC3+TFI+iWood+TFI*iWood	17	-1344.98	2725.37	2.88	0.049
	CropType+PC1+PC2+PC3+TFI+pWood+TFI*pWood	17	-1345.36	2726.13	3.64	0.034
	CropType+PC1+PC2+PC3	14	-1352.50	2733.96	11.47	0.001
Crop-level aphid	CropType+PC1+PC2+PC3+TFI+iWood+TFI*iWood	17	-1341.23	2717.88	0.00	0.698
	CropType+PC1+PC2+PC3+TFI+pMeadow+TFI*pMeadow	17	-1343.17	2721.76	3.88	0.100
	CropType+PC1+PC2+PC3+TFI+pSNH+TFI*pSNH	17	-1343.77	2722.96	5.08	0.055
	CropType+PC1+PC2+PC3+TFI+SHDI+TFI*SHDI	17	-1343.94	2723.30	5.42	0.046
	CropType+PC1+PC2+PC3	14	-1347.39	2723.75	5.87	0.037
	CropType+PC1+PC2+PC3+TFI+iSNH+TFI*iSNH	17	-1344.49	2724.40	6.52	0.027
	CropType+PC1+PC2+PC3+TFI+iMeadow+TFI*iMeadow	17	-1345.23	2725.88	8.00	0.013
	CropType+PC1+PC2+PC3+TFI+pTargetCrop+TFI*pTargetCrop	17	-1345.24	2725.90	8.02	0.013
	CropType+PC1+PC2+PC3+TFI+pWood+TFI*pWood	17	-1345.46	2726.34	8.46	0.010

Table S10. Averaged estimated effects of the synthetic meteorological variables (PC axes scores), pesticide use intensity index (TFI), landscape variables and their interaction on the four predation rates for different sub-datasets or different TFI calculation. Full dataset: same results as in Table 1 in the main text; Without IFT=0: dataset without all situations with no local pesticide use at all; only herbicides: TFI calculated with only herbicides; without herbicides: TFI calculated with only pesticides that are not herbicides. Grey lines corresponds to significant effects when using the full dataset.

Effect	Weed seed				Ephestia				Ground-level aphid				Crop-level aphid			
	Full dataset	Without IFT=0	Only herbicides	Without herbicides	Full dataset	Without IFT=0	Only herbicides	Without herbicides	Full dataset	Without IFT=0	Only herbicides	Without herbicides	Full dataset	Without IFT=0	Only herbicides	Without herbicides
PC1	**-1.49** ***	**0.93** *	**-1.47** ***	**-1.49** ***	**-1.51** ***	**1.14** *	**-1.58** ***	**-1.48** ***	0.23 ns	0.16 ns	0.15 ns	0.22 ns	-0.40 ns	-0.44 ns	-0.44 ns	-0.39 ns
PC2	**-0.68** *	**-1.11** ***	**-0.63** *	**-0.67** *	-0.56 ns	**-1.06** **	-0.58 ns	-0.54 ns	0.28 ns	0.26 ns	0.45 ns	0.30 ns	-0.30 ns	-0.30 ns	-0.20 ns	-0.34 ns
PC3	**-0.73** *	0.28 ns	**-0.71** *	**-0.73** *	**1.06** *	**1.24** **	**1.06** *	**1.03** *	0.26 ns	0.29 ns	0.32 ns	0.26 ns	-0.38 ns	-0.37 ns	-0.39 ns	-0.38 ns
TFI	-1.16 ns	-1.07 ns	-0.74 ns	-1.11 ns	**-2.23** *	-1.80 ns	-1.80 ns	**-2.25** *	-0.47 ns	-0.20 ns	-0.54 ns	-0.15 ns	0.53 ns	0.47 ns	1.38 ns	-0.01 ns
SHDI	1.43 ns	**1.59** *	0.89 ns	1.16 ns	1.31 ns	1.83 ns	1.68 ns	1.03 ns	**1.67** *	**1.82** *	**1.60** *	*1.35 ns*	0.06 ns	0.16 ns	0.10 ns	-0.40 ns
pWood	-1.01 ns	-1.10 ns	-0.91 ns	-0.80 ns	1.08 ns	1.42 ns	0.91 ns	0.52 ns	0.68 ns	0.89 ns	1.19 ns	0.18 ns	0.05 ns	0.18 ns	0.41 ns	-0.49 ns
pMeadow	1.11 ns	1.18 ns	0.60 ns	1.06 ns	1.20 ns	1.57 ns	1.05 ns	1.21 ns	**1.58** *	**1.56** *	*1.36 ns*	**1.63** *	0.85 ns	0.85 ns	0.95 ns	0.60 ns
pSNH	0.64 ns	0.71 ns	0.09 ns	0.63 ns	1.53 ns	**2.00** *	1.42 ns	1.28 ns	**1.62** *	**1.68** *	**1.68** *	**1.41** *	0.76 ns	0.79 ns	0.94 ns	0.32 ns
pTargetCrop	**-1.61** *	**-1.64** *	*-1.36 ns*	**-1.56** *	**-3.75** ***	**-3.44** **	**-2.85** **	**-3.64** ***	-0.95 ns	-0.69 ns	**-1.63** *	-0.67 ns	-0.51 ns	-0.29 ns	-1.36 ns	0.54 ns
iWood	-0.48 ns	-0.61 ns	-0.35 ns	-0.41 ns	**1.57** *	*1.19 ns*	*1.33 ns*	*1.31 ns*	0.88 ns	0.66 ns	1.28 ns	0.68 ns	0.99 ns	0.83 ns	1.29 ns	0.69 ns
iMeadow	0.42 ns	0.50 ns	0.22 ns	0.10 ns	-0.71 ns	-0.28 ns	-0.34 ns	-0.53 ns	1.02 ns	1.08 ns	0.62 ns	0.47 ns	0.50 ns	0.55 ns	0.27 ns	0.30 ns
iSNH	0.02 ns	0.02 ns	-0.07 ns	-0.21 ns	0.32 ns	0.42 ns	0.60 ns	0.33 ns	1.47 ns	1.36 ns	1.29 ns	0.92 ns	0.63 ns	0.57 ns	0.31 ns	0.30 ns
TFI*SHDI	-2.82 ns	-3.04 ns	-1.31 ns	-2.37 ns	-1.07 ns	-2.43 ns	-2.08 ns	-0.33 ns	-3.13 ns	-3.48 ns	-2.73 ns	-2.58 ns	-1.70 ns	-1.90 ns	-1.45 ns	-0.61 ns
TFI*pWood	2.21 ns	2.11 ns	1.76 ns	1.89 ns	-2.67 ns	-3.74 ns	-1.94 ns	-1.37 ns	-1.14 ns	-1.62 ns	-2.22 ns	0.25 ns	-0.23 ns	-0.52 ns	-1.03 ns	1.39 ns
TFI*pMeadow	-2.27 ns	-2.22 ns	-0.70 ns	-2.37 ns	-1.64 ns	-2.48 ns	-1.32 ns	-1.85 ns	**-4.10** *	**-4.03** *	*-3.13 ns*	**-4.78** *	**-3.19** *	**-3.15** *	*-2.92 ns*	*-2.88 ns*
TFI*pSNH	-1.24 ns	-1.36 ns	0.36 ns	-1.31 ns	-2.67 ns	-3.93 ns	-2.32 ns	-2.21 ns	-3.88 ns	**-4.01** *	**-3.63** *	-3.67 ns	-2.87 ns	-2.94 ns	-2.84 ns	-1.91 ns
TFI*pTargetCrop	1.57 ns	1.58 ns	0.88 ns	1.67 ns	**6.95** **	**6.30** *	**4.18** *	**7.93** **	0.43 ns	-0.18 ns	2.16 ns	-0.52 ns	1.07 ns	0.55 ns	3.04 ns	-2.23 ns
TFI*iWood	0.49 ns	0.69 ns	0.23 ns	0.42 ns	-2.60 ns	-2.07 ns	-1.90 ns	-2.06 ns	-1.55 ns	-1.09 ns	-2.43 ns	-1.06 ns	**-3.82** **	**-3.48** *	**-4.19** **	**-3.36** *
TFI*iMeadow	-2.18 ns	-2.23 ns	-1.10 ns	-1.69 ns	0.84 ns	-0.35 ns	0.13 ns	0.41 ns	-3.20 ns	-3.36 ns	-1.41 ns	-2.27 ns	-0.63 ns	-0.78 ns	-0.17 ns	-0.22 ns
TFI*iSNH	-1.81 ns	-1.80 ns	-1.00 ns	-1.43 ns	-0.33 ns	-1.13 ns	-0.71 ns	-0.32 ns	-3.59 ns	-3.45 ns	-2.22 ns	-2.50 ns	-2.30 ns	-2.27 ns	-1.10 ns	-1.67 ns