Foraging preferences of honeybees (Apis melliferaL.) analysed by pollen metabarcoding along an urban-rural gradient, across seasons

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Appendices

A Pollen sample characteristics

Table 4 – Observations among the 18 sites from March to April."Sampling duration" indicates the number of hours the pollen traps were deployed.

Sample ID	Location	Month	Day	Season	Sampling duration (hours)
A-1	Enokisawa.A	April	23	Spring	10
A-2	Enokisawa.A	May	15	Spring	9
A-3	Enokisawa.A	June	14	Summer	7
A-4	Enokisawa.A	July	25	Summer	9
A-5	Enokisawa.A	August	21	Summer	9.5
A-6	Enokisawa.A	September	19	Autumn	8
B-1	Enokisawa.B	April	23	Spring	8.5
B-2	Enokisawa.B	May	15	Spring	9
B-3	Enokisawa.B	June	14	Summer	9
B-4	Enokisawa.B	July	25	Summer	9
O-1	Kuwata	April	23	Spring	8.5
O-2	Kuwata	May	15	Spring	9.25
O-3	Kuwata	June	14	Summer	7.6
C-1	Yachiyo	April	16	Spring	9
C-2	Yachiyo	May	22	Spring	9
C-3	Yachiyo	June	25	Summer	9
C-4	Yachiyo	July	31	Summer	9
C-5	Yachiyo	August	31	Summer	9
D-1	Ichihara	April	23	Spring	9
D-2	Ichihara	May	30	Spring	8.17
D-3	Ichihara	June	18	Summer	4
D-4	Ichihara	July	26	Summer	8
D-5	Ichihara	July	30	Summer	3.5
D-6	Ichihara	August	26	Summer	9
D-7	Ichihara	September	20	Autumn	6.5

Sample ID	Location	Month	Day	Season	Sampling duration (hours)
E-1	Nerima	April	17	Spring	9
E-2	Nerima	May	13	Spring	2.25
E-3	Nerima	June	8	Summer	2.5
E-4	Nerima	July	8	Summer	2.7
E-5	Nerima	August	11	Summer	7.42
E-6	Nerima	September	15	Autumn	5.25
F-1	Shiba	April	22	Spring	24
F-2	Shiba	May	7	Spring	46
F-3	Shiba	May	15	Spring	23.25
F-4	Shiba	May	25	Spring	24
F-5	Shiba	June	5	Summer	22
F-6	Shiba	June	19	Summer	24
F-7	Shiba	June	26	Summer	25
F-8	Shiba	July	10	Summer	23
F-9	Shiba	July	24	Summer	21
F-10	Shiba	July	31	Summer	22
F-11	Shiba	August	7	Summer	22
F-12	Shiba	August	28	Summer	21
F-13	Shiba	September	4	Autumn	21
G-1	Togo	April	29	Spring	13
G-2	Togo	May	26	Spring	11
G-3	Togo	June	16	Summer	8
G-4	Togo	July	25	Summer	9
G-5	Togo	August	25	Summer	10
G-6	Togo	September	20	Autumn	10
H-1	Colombin	April	16	Spring	9
H-2	Colombin	May	17	Spring	9
H-3	Colombin	June	18	Summer	9
H-4	Colombin	July	17	Summer	9.5
H-5	Colombin	August	20	Summer	9
H-6	Colombin	September	24	Autumn	9
I-1	Shinjyuku	April	18	Spring	9.17
I-2	Shinjyuku	May	15	Spring	9
I-3	Shinjyuku	June	19	Summer	9.08
I-4	Shinjyuku	July	17	Summer	8.92
I-6	Shinjyuku	September	17	Autumn	9.08

Sample ID	Location	Month	Day	Season	Sampling duration (hours)
J-1	Toyosu	April	22	Spring	8
J-2	Toyosu	May	27	Spring	6.5
J-3	Toyosu	July	18	Summer	29
K-1	Yamatecho	April	15	Spring	8.75
K-2	Yamatecho	May	17	Spring	9
K-3	Yamatecho	June	26	Summer	11
K-4	Yamatecho	July	26	Summer	8
K-5	Yamatecho	August	9	Summer	7.5
K-6	Yamatecho	September	11	Autumn	8
L-1	Ishikawacho	April	20	Spring	70.17
L-2	Ishikawacho	May	31	Spring	24
L-3	Ishikawacho	June	17	Summer	48
L-4	Ishikawacho	August	9	Summer	24
L-5	Ishikawacho	August	23	Summer	25
L-6	Ishikawacho	September	5	Autumn	53
L-7	Ishikawacho	September	20	Autumn	55
M-1	Gumyoji	April	19	Spring	42
M-2	Gumyoji	April	27	Spring	47
M-3	Gumyoji	May	10	Spring	27
M-4	Gumyoji	May	17	Spring	26
M-5	Gumyoji	May	24	Spring	26
M-6	Gumyoji	May	31	Spring	26
M-7	Gumyoji	August	30	Summer	26
M-8	Gumyoji	September	16	Autumn	26
M-9	Gumyoji	September	28	Autumn	55

Sample ID	Location	Month	Day	Season	Sampling duration (hours)
N-1	Honmoku	May	2	Spring	9
N-2	Honmoku	May	8	Spring	9
N-3	Honmoku	May	15	Spring	9
N-4	Honmoku	May	24	Spring	9
N-5	Honmoku	June	5	Summer	9
N-6	Honmoku	June	13	Summer	8
N-7	Honmoku	June	26	Summer	9
N-8	Honmoku	July	3	Summer	9
N-9	Honmoku	July	10	Summer	9
N-10	Honmoku	July	30	Summer	9
N-11	Honmoku	September	7	Autumn	9
N-12	Honmoku	September	25	Autumn	9
NP1-A	Nishichiba	March	NC	Spring	NC
NP2-B	Nishichiba	March	NC	Spring	NC
NP3-B	Nishichiba	March	NC	Spring	NC
NP4-C	Nishichiba	March	NC	Spring	NC
NP5-A	Nishichiba	March	NC	Spring	NC
NP6-A	Nishichiba	April	NC	Spring	NC
NP7-B	Nishichiba	April	NC	Spring	NC
NP8-B	Nishichiba	April	NC	Spring	NC
NP9-B	Nishichiba	April	NC	Spring	NC
NP10-A	Nishichiba	May	NC	Spring	NC
V-1	Nishichiba	May	NC	Spring	NC
V-2	Nishichiba	June	NC	Summer	14
V-3	Nishichiba	July	NC	Summer	17
V-4	Nishichiba	August	NC	Summer	13
V-5	Nishichiba	September	NC	Autumn	25
NH- 1	Nishichiba	March	NC	Spring	NC
KP1-B	Kashiwanoha	March	NC	Spring	NC
KP2-C	Kashiwanoha	March	NC	Spring	NC
KP3-A	Kashiwanoha	March	NC	Spring	NC
KP4-A	Kashiwanoha	March	NC	Spring	NC
KP5-A	Kashiwanoha	March	NC	Spring	NC

Sample ID	Location	Month	Day	Season	Sampling duration (hours)
KP6-A	Kashiwanoha	April	NC	Spring	NC
KP7-A	Kashiwanoha	April	NC	Spring	NC
KP8-A	Kashiwanoha	April	NC	Spring	NC
KP9-B	Kashiwanoha	April	NC	Spring	NC
KP10-A	Kashiwanoha	May	NC	Spring	NC
KP11-A	Kashiwanoha	May	NC	Spring	NC
W-1	Kashiwanoha	June	NC	Summer	12
W-2	Kashiwanoha	July	NC	Summer	13
W-3	Kashiwanoha	August	NC	Summer	16
W-4	Kashiwanoha	September	NC	Autumn	3
KH-1	Kashiwanoha	March	NC	Spring	NC
MP1-A	Inohana	March	NC	Spring	NC
MP2-A	Inohana	March	NC	Spring	NC
MP3-A	Inohana	April	NC	Spring	NC
MP4-C	Inohana	April	NC	Spring	NC
MP5-A	Inohana	April	NC	Spring	NC
MP6-A	Inohana	April	NC	Spring	NC
MP7-C	Inohana	May	NC	Spring	NC
MP8-B	Inohana	May	NC	Spring	NC
X-1	Inohana	June	NC	Summer	11
X-2	Inohana	July	NC	Summer	17
X-3	Inohana	August	NC	Summer	14
X-4	Inohana	September	NC	Autumn	9
MH-1	Inohana	March	NC	Spring	NC

B Principal Component Analysis results of landscape metrics

Table 5 – Results of the PCA describing the relation of each variable with the first two dimensions.

	Dim.1			Dim.2		
Variables	**cor.**	**cos²**	**contrib.**	**cor.**	**cos²**	**contrib.**
Density population [inhab./km²]	0.93	0.8615	15.08	0.03	0.0006	0.08
IIC [-]	-0.89	0.7916	13.86	-0.43	0.1873	24.40
MESH [ha]	-0.82	0.6658	11.66	-0.56	0.3154	41.07
NDVI median [-]	-0.89	0.7972	13.96	0.32	0.1019	13.27
SHEI [-]	-0.92	0.8397	14.70	0.35	0.1245	16.22
vegetation cover (%)	-0.98	0.9562	16.74	0.15	0.0219	2.85
Patch density [nbr/km²]	0.89	0.7992	13.99	-0.13	0.0161	2.10

cor: correlation between variables and dimensions
cos²: quality of representation of variables on the PCA plot, equal to squared coordinates
contrib: percentage contribution of variables to principal components, equal to (var.cos²*100)/(pc.cos²)

C Shepard diagram

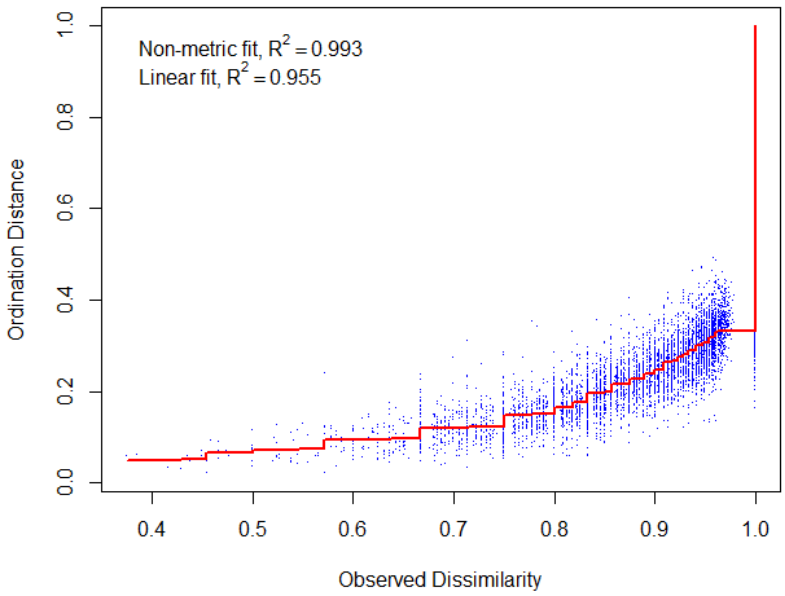

Figure 17 – Plot of ordination distances and monotone or linear fit line in regards to observed dissimilarities. Non-metric fit is derived from the stress value, $R^2 = 1 - S^2$. Linear fit represents squared correlation between adjusted values and ordination distances.