Supplementary Information to:

Food availability and population parameters for squirrels differ even in neighbouring urban parks

Bianca WIST[1]*, Kathrin H. DAUSMANN[1]

[1]*Functional Ecology, Institute of Cell and Systems Biology of Animals, Universität Hamburg, Hamburg, Germany*

*Corresponding author; bianca.wist@uni-hamburg.de

Suppl. Tab. 1: kJ values per seed or average cone for tree seed species found in random seed plots at the four different study sites

Seed species	kJ per seed or cone	reference	comments
Abies alba	145.80	Salmaso et al. 2009	per cone
Acer sp.	1.70	Grodzinski 1970 and Jensen et al. 1985	calculated from *A. pseudoplatanus* und *A. plantanoides*
Aesculus hippocastanum	203.30	Papageorgiou (1978)	
Alnus glutinosa	0.03	Grodzinski 1970	
Betula pubescens	0.04	Jensen et al. 1985	calculated from *B. verrucosa* and *B. pendula*
Betula sp.	0.04	Jensen et al. 1985	calculated from *B. verrucosa* and *B. pendula*
Carpinus betulus	0.89	Grodzinski 1970	
Corylus avellana	18.71	Jensen et al. 1985	
Fagus sylvatica	3.71	Grodzinski 1970, Jensen et al. 1985, Wauters & Casale 1996	mean value
Fraxinus excelsior	0.88	Jensen et al. 1985	
Ilex sp.	11.07	Burns and Viers 1973 (*Ilex vomitoria*), Williams et al. 2000	calculated value using average seed weight
Lonicera xylosteum	1.30	Burns and Viers 1973; Williams 2001	calculated value using average seed weight
Picea abies	51.10	Salmaso et al. 2009	per cone
Pinus sylvestris	7.50	Salmaso et al. 2009	per cone
Quercus sp.	25.70	Wauters & Casale 1996	value taken from *Quercus robur*
Robinia pseudoacacia	0.26	Grodzinski 1970	
Rosa canina	27.40	USDA 2019, Esitken 2004	calculated value using average fruit weight
Taxus baccata	2.28	Burns and Viers 1973; Williams 2001	calculated value
Tilia sp.	0.63	Grodzinski 1970	value taken from *Tilia cordata*
Tsuga canadensis	1.37	Boone & Mortelliti 2019, Turgeon et al. 2011	calculated value using information from both references
Tsuga sp.	1.37	Boone & Mortelliti 2019, Turgeon et al. 2011	calculated value using information from both references

Suppl. Tab. 2: kJ values (per g) and references for anthropogenically provided food items found in the three urban parks.

food item	kJ/g	reference	least assessed	comments
apple	2.6	USDA (2022)	21.06.2023	
bell pepper	1.3	USDA (2022)	21.06.2023	
bird seed mix	20.2	vivara.de	29.06.2023	mean value, calculated from six comercial products
bread (white)	11.2	USDA (2019)	21.06.2023	
bread and bread rolls (mix)	11.3	USDA (2019)	21.06.2023	
bread roll (white)	11.4	USDA (2019)	21.06.2023	
brussel sprouts	1.8	USDA (2019)	21.06.2023	
cabbage	1.0	USDA (2019)	21.06.2023	
carrot	1.7	USDA (2022)	21.06.2023	
carrot, boiled	1.5	USDA (2019)	21.06.2023	
chestnuts	20.3	Papageorgiou (1978)	21.06.2023	
cucumber	0.7	USDA (2022)	21.06.2023	
currants	2.6	USDA (2019)	21.06.2023	
egg, boiled with shell	6.5	USDA (2019)	21.06.2023	
fat and seed mix for birds	22.9	vivara.de	29.06.2023	mean value, calculated from six comercial products
Ferrero Küsschen	26.1	manufacturers specifications	21.06.2023	
foxtail millet	13.1	Tirajoh et al. (2014)	21.06.2023	
fruit salad	2.4	USDA (2022)	21.06.2023	
corn	2.8	USDA (2019)	21.06.2023	
grapes	3.3	USDA (2022)	21.06.2023	
hazelnut	26.8	USDA (2023)	21.06.2023	
home made seed dumpling	19.3	vivara.de	29.06.2023	mean value, calculated from six comercial products
honeydew melon	1.5	USDA (2019)	21.06.2023	
kohlrabi	1.1	USDA (2019)	21.06.2023	
leek	2.6	USDA (2019)	21.06.2023	
lettuce	0.7	USDA (2022)	21.06.2023	
mix for rodents	17.4	Alvarenga et al. (2017)		
nectarine	1.8	USDA (2019)	21.06.2023	
oats	15.9	USDA (2022)	21.06.2023	
orange	2.2	USDA (2019)	21.06.2023	
pancake	9.5	USDA (2019)	21.06.2023	
peanuts	24.6	USDA (2023)	21.06.2023	
pear peel	2.6	USDA (2019)	21.06.2023	
pineapple, canned	2.3	USDA (2022)	21.06.2023	
pistachios	23.9	USDA (2019)	21.06.2023	
"PommDöner" (kebab with fries and salad)	9.6	fddb.de	21.06.2023	
rice, boiled	4.1	USDA (2019)	21.06.2023	
salad	1.8	USDA (2022)	21.06.2023	
fat ball for birds	21.0	vivara.de	29.06.2023	mean value, calculated from six comercial products
seed ring for birds	22.9	vivara.de	29.06.2023	mean value, calculated from six comercial products
sunflower seeds	25.5	USDA (2023)	21.06.2023	
tomato	0.8	USDA (2019)	21.06.2023	
tomato, grilled	2.1	USDA (2022)	21.06.2023	
vegetable mix	1.2	USDA (2022)	21.06.2023	mean value from carrot, cabbage and lettuce (USDA)
walnuts	30.6	USDA (2022)	21.06.2023	
watermelon	1.3	USDA (2019)	21.06.2023	

Suppl. Tab. 3: Tree species abundance in % at the four different study sites

tree species	Hahnheide	Jakobipark	Schanzenpark	Wohlerspark
Abies spec.	0.8			0.2
Acer campestre		1.5	9.6	0.5
Acer ginnala		1.1		
Acer negundo				0.2
Acer palmatum				0.5
Acer platanoides		4.1	6.0	
Acer pseudoplatanus		12.8	11.0	5.4
Acer saccharinum			0.4	
Acer spec.		0.4		
Aesculus hippocastanum		2.6	1.5	2.9
Ailanthus altissima		0.4	0.7	
Alnus glutinosa		0.4		
Alnus rubra	2.2			
Betula pendula	0.1	19.9	1.9	9.9
Betula pubescens				0.3
Carpinus betulus		1.5	11.4	4.8
Catalpa bignonioides				0.2
Catalpa erubescens		0.4		
Cedrus atlantica				0.2
Cercis spec.		0.4		
Chamaecyparis lawsoniana				0.2
Cornus spec.			0.1	
Crataegus laevigata			0.3	0.2
Crataegus monogyna			0.4	
Fagus sylvatica	36.0	7.5	3.2	1.6
Fraxinus excelsior		7.1	0.9	0.2
Ginkgo biloba		0.4	0.3	0.2
Ilex aquifolium				0.2
Ilex spec.				1.9
Juniperus communis		0.4		
Larix decidua	0.2			
Larix kaempferi	6.7			
Liriodendron tulipifera				0.2
Magnolia spec.				0.3
Malus spec.		0.4	0.4	0.6
Parrotia persica		0.4		
Picea abies	33.7			0.2
Picea omorika				1.3
Picea pungens				0.5
Picea sitchensis	0.6			
Pinus nigra		0.4	2.8	
Pinus strobus		0.4		0.5
Pinus sylvestris	14.0			
Platanus acerifolia			2.0	
Platanus spec.		1.5		
Populus canadensis			0.6	
Populus canescens			0.3	

Populus lasiocarpa				0.6
Prunus 'Accolade'		1.9		
Prunus cerasifera			0.3	0.5
Prunus mahaleb			0.3	
Prunus padus			0.1	0.2
Prunus serotina			0.1	
Prunus serrulata				1.3
Prunus spec.			0.1	0.6
Pseudotsuga menziesii	4.4			0.5
Quercus palustris			0.1	
Quercus petraea			0.1	
Quercus robur		17.7	7.7	3.8
Quercus rubra		0.4	1.8	0.5
Quercus spec.	1.3			
Robinia pseudoacacia			9.1	0.3
Robinia spec.		1.9		
Salix caprea				0.2
Salix fragilis				0.2
Sorbus aria				0.2
Sorbus intermedia			0.6	
Taxodium distichum				0.5
Taxus baccata		1.5		2.1
Taxus spec.		5.6		
Thuja spec.				0.3
Tilia cordata			4.5	
Tilia euchlora			0.1	
Tilia platyphyllos			3.4	0.2
Tilia spec.		0.4	0.1	
Tilia tomentosa			0.3	
Tilia vulgaris		3.0	17.1	54.4
Tsuga canadensis				0.6
Tsuga heterophylla				0.2
Ulmus glabra		1.1		
Ulmus hollandica		1.9		0.2
unknown species		0.8		

Suppl. Tab. 4 Overview of food item details from the four different study sites in the summer season

	Hahnheide	Schanzenpark	Jacobipark	Wohlerspark
bird food			**x**	
bird seed mix			x	
nuts or peanuts			**x**	**x**
peanuts				x
fruits		**x**	**x**	**x**
apples		x		x
honeydew melon				x
watermelon			x	x
fruit salad				x
grapes				x
currants				x
vegetables			**x**	**x**
tomato				x
tomato (grilled)			x	
carrot				x
cabbage				x
bakery products		**x**		**x**
bread		x		x
pancake				x
fast food				**x**
kebab & fries				x

Suppl. Tab. 5 Overview of human-provided food items across the year in g and kJ in Wohlerspark. Spring and summer values show means from three days of observation, winter from eight days (autumn: one day). Peanuts have been placed into a common category with nuts

	winter		**spring**		**summer**		**autumn**	
	g	**kJ**	**g**	**kJ**	**g**	**kJ**	**g**	**kJ**
bird food	960	18,366	50	874	0	0	689	13,918
nuts or peanuts	303	7,841	0	0	20	492	0	0
fruits (fresh/canned)	4,633	11,817	230	367	1,010	1,876	15	50
vegetables (raw/boilded/grilled)	523	614	182	287	317	522	620	674
bakery products	78	877	63	708	283	3,134	40	447
fast food	0	0	50	203	53	514	0	0
egg (boiled)	0	0	23	151	0	0	0	0
sweets (chocolate)	0	0	6	157	0	0	0	0
total in g / kJ	**6,497**	**39,515**	**604**	**2,747**	**1,683**	**6,537**	**1,364**	**15,089**

Body condition index (BCI)

Methods

We assessed body condition by using a simple ratio index of the measured body mass in grams and the nose-anus length in centimeters (Labocha et al. 2014, Wist et al. 2022).

We tested for difference in BCI between sexes using a t-test prior to further analysis which was non-significant ($t = 1.00$, $df = 34$, $p = 0.32$). We performed a one-way analysis of variance (ANOVA) with one BCI per individual to examine differences in BCI group means between sites in the summer season. This was followed by post-hoc multiple comparisons (Tukey HSD). ANOVA assumptions were tested by using residual analysis. Furthermore, we used two-tailed Fisher's exact test to test for differences in sex proportions between sites. Repeated measures ANOVA (rmANOVA) including Mauchly's test of sphericity (Mauchly 1940) was used to investigate differences in BCI means across all four seasons in Wohlerspark. We used Greenhouse-Geisser correction since sphericity was violated (Girden 1992).

Results

A one-way ANOVA showed significant differences in BCI between sites ($F_{3,32} = 8.34$, $p < 0.001$; Suppl. Tab. 3, Suppl. Fig. 1). However, post-hoc multiple comparisons revealed that only Wohlerspark differed significantly from the other three sites ($p < 0.05$).

Tab. 6 Descriptive statistics for summer BCI at the four different study sites. Given are the numbers of adult individuals per site (n), BCI group means, standard deviation as well as minimum and maximum values per site.

Site	n	Mean	SD	min	max
Hahnheide	3	17.52	1.03	16.43	18.47
Schanzenpark	4	17.70	2.02	16.38	20.65
Jacobipark	9	16.94	1.36	14.52	19.52
Wohlerspark	20	15.37	0.83	13.92	17.40

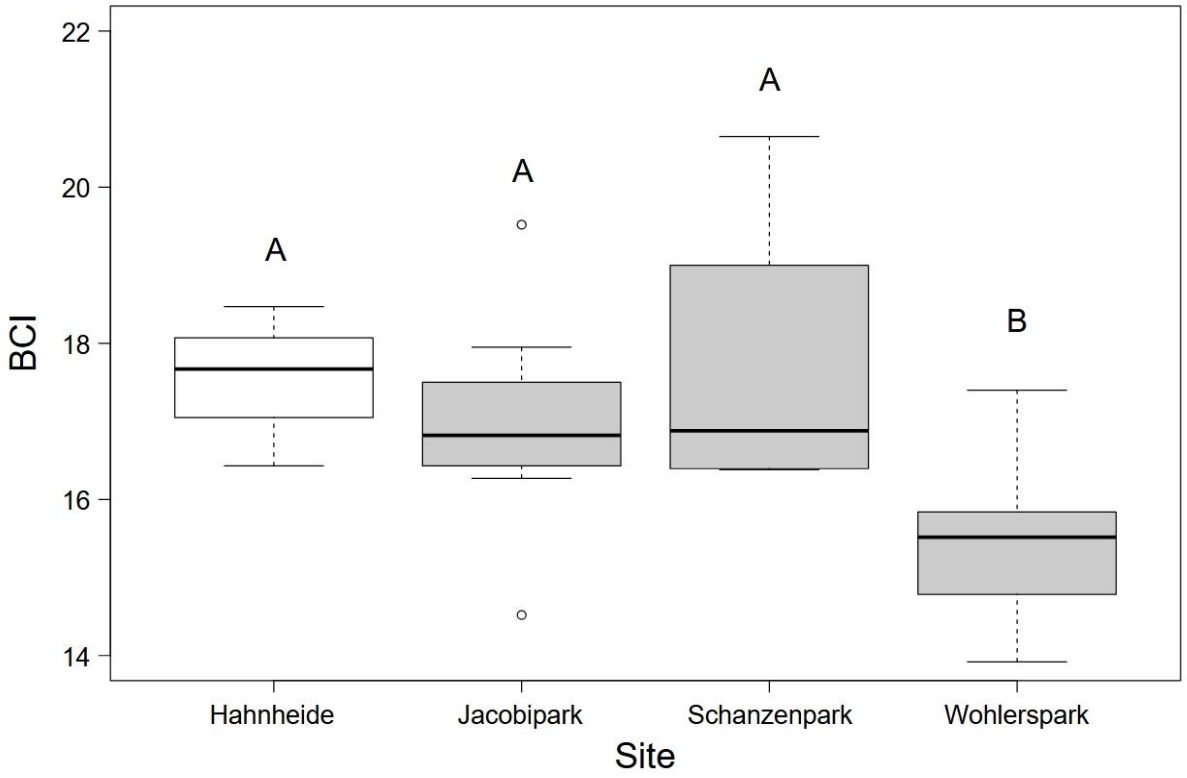


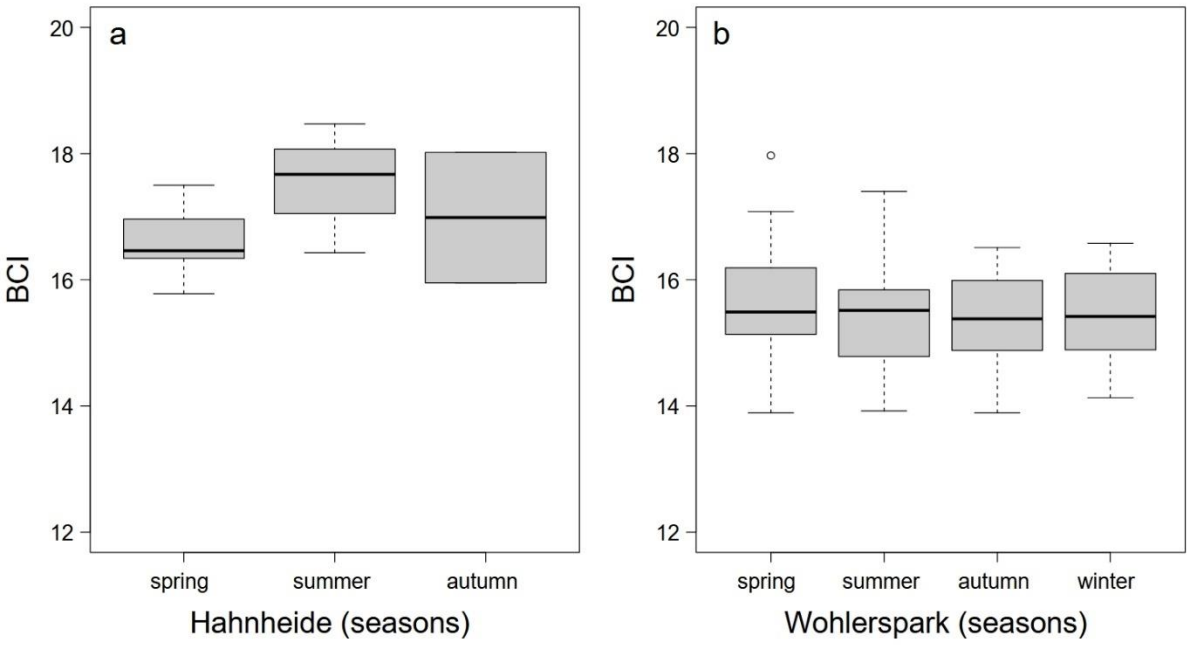
Fig. 1 Body condition index of adult individuals at the four different study sites in summer. N = 36 (thereof $n_{Hahnheide}$: 3, $n_{Jacobipark}$: 9, $n_{Schanzenpark}$: 4 and $n_{Wohlerspark}$: 20 individuals); different letters indicate statistical difference (Tukey HSD, $p < 0.05$)

Suppl. Tab. 7: Descriptive statistics for BCI of adult individuals at Hahnheide and Wohlerspark in all trapping seasons. Given are the number of individuals per site and season (n), BCI group means, standard deviation, standard error as well as minimum and maximum values per group

Site	season	n	mean	SD	min	max
Hahnheide	spring	5	16.61	0.65	15.78	17.50
Hahnheide	summer	3	17.52	1.03	16.43	18.47
Hahnheide	autumn	2	16.98	1.46	15.95	18.02
Wohlerspark	spring	20	15.67	0.93	13.89	17.97
Wohlerspark	summer	20	15.37	0.83	13.92	17.40
Wohlerspark	autumn	21	15.36	0.70	13.89	16.51
Wohlerspark	winter	17	15.49	0.78	14.13	16.58

BCI of individuals from Wohlerspark did not significantly differ between seasons (rmANOVA: $F_{1.21,\ 6.05} = 3.51$, $p = 0.11$, Suppl. Tab. 5, Suppl. Fig. 2). Low sample sizes in combination with no trapped individuals in winter did not allow for robust analysis of seasonal differences in BCI in the forest (Suppl. Tab. 5, Suppl. Fig. 2). However, lower body condition in squirrels from

Wohlerspark in comparison with forest squirrels seemed to occur year-round and confirmed during trapping in spring for another study on male individuals in the years 2018/2019 (Wist et al. 2022).



Suppl. Fig. 2 Body condition index (BCI, of adult individuals at Hahnheide (a, n_{spring} = 5, n_{summer} = 3, n_{autumn} = 2) and Wohlerspark (b, n_{spring} = 20, n_{summer} = 20, n_{autumn} = 21, n_{winter} = 17) for all four seasons

References

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