

Supplementary Material

Spatio-temporal complexity of chimpanzee food:
How cognitive adaptations can counteract the ephemeral nature of ripe fruit.

Karline R. L. Janmaat, Christophe Boesch, Richard Byrne, Colin A. Chapman, Zoro B. Goné Bi, Josephine S. Head, Martha M. Robbins, Richard W. Wrangham, and Leo Polansky

Table S1. The lowest, highest and average monthly percentage of monitored trees that bore ripe fruit per year in Kanyawara, Tai and Loango forest.

PERCENTAGE OF CHIMPANZEE FOOD TREES THAT BEARS RIPE FRUIT

Kanyawara (East Africa)					Tai South* (West Africa)					Tai North* (West Africa)					Loango (Central Africa)				
Year	Mean	Lowest	Highest	months	Year	Mean	Lowest	Highest	months	Year	Mean	Lowest	Highest	months	Year	Mean	Lowest	Highest	months
1990	1.8	0.1	10.4	12	1997	4.2	0.3	9.8	6	1997	6.8	2.8	12.5	11	2006	10.9	5.0	14.6	6
1991	1.3	0.1	8.0	12	1998	6.5	2.0	10.0	9	1998	6.8	2.8	11.9	12	2007	9.7	1.1	15.2	12
1992	2.6	0.2	10.4	12	1999	6.7	3.9	12.9	12	1999	5.7	3.7	8.9	12	2008	12.7	4.4	25.6	12
1993	3.3	0.2	10.0	12	2000	12.3	3.6	30.2	12	2000	5.8	2.0	9.7	12	2009	11.3	6.0	16.3	12
1994	4.7	0.9	14.0	12	2001	13.3	5.6	38.8	10	2001	10.3	7.2	17.6	10	2010	12.3	2.9	20.8	11
1995	3.7	0.8	8.4	12	2002	7.0	2.0	14.7	11	2002	4.6	1.2	12.9	10	2011	9.9	2.2	17.4	12
1996	4.6	0.4	25.8	12	2003	10.9	6.5	20.9	6	2004	7.1	2.5	16.0	12					
1997	2.8	0.0	11.8	12	2004	9.8	3.7	23.2	11	2005	8.3	2.7	13.8	8					
1998	0.6	0.0	1.9	11	2005	13.4	5.8	25.7	8	2006	5.6	2.2	11.7	12					
1999	4.9	1.3	12.1	12	2006	8.7	1.8	20.0	10	2007	11.1	3.1	21.1	12					
2000	5.0	0.0	12.0	12	2007	5.7	1.5	16.8	11	2008	14.0	1.9	28.5	12					
2001	7.0	2.7	12.8	12	2008	7.1	0.6	17.3	11	2009	10.0	2.8	20.6	10					
2002	7.3	2.7	13.9	12	2009	7.3	2.4	13.6	9	2010	12.5	3.9	26.7	9					
2003	7.8	0.0	19.9	12	2010	12.8	5.6	38.3	10										
2004	7.4	1.4	20.7	12															
2005	12.1	1.4	29.0	12															
2006	5.7	1.4	10.3	12															
2007	3.4	0.7	8.9	12															
2008	4.2	0.0	10.4	12															
2009	2.7	0.6	7.5	11															
2010	5.0	0.0	14.2	11															
total	4.7	0.0	29.0	249	total	9.0	0.3	38.8	135	total	8.3	1.2	28.5	142	total	11.1	0.0	29.0	65

*Separate values for transects walked in the territory of the South and North chimpanzee community. Only years with min 6 months of data collection are included. Means at last row concern weighted means.

Table S2 The lowest, highest and average monthly percentage of monitored trees that bore unripe fruit per year in Kanyawara, Tai and Loango forest

PERCENTAGE OF CHIMPANZEE FOOD TREES THAT BEARS UNRIPE FRUIT

Kanyawara (East Africa)					Tai South* (West Africa)					Tai North* (West Africa)					Loango (Central Africa)				
Year	Mean	Lowest	Highest	months	Year	Mean	Lowest	Highest	months	Year	Mean	Lowest	Highest	months	Year	Mean	Lowest	Highest	months
1990	11.6	1.5	22.6	12	1997	16.5	13.9	21.0	6	1997	11.6	0.0	19.5	11	2006	7.4	1.2	14.3	6
1991	12.1	3.2	24.8	12	1998	11.6	3.2	23.0	9	1998	12.2	4.3	24.0	12	2007	11.7	4.9	19.5	12
1992	14.9	8.3	22.5	12	1999	14.8	8.2	21.6	12	1999	11.3	8.2	18.6	12	2008	12.9	5.5	27.4	12
1993	17.4	3.6	30.4	12	2000	21.1	5.7	34.2	12	2000	13.5	0.0	31.8	12	2009	13.9	9.3	21.8	12
1994	15.8	4.5	22.6	12	2001	16.0	8.3	24.5	10	2001	15.5	4.4	28.2	10	2010	14.3	5.5	25.6	11
1995	15.6	4.3	27.2	12	2002	15.1	3.2	22.1	11	2002	14.0	4.6	19.6	10	2011	15.4	4.9	25.5	12
1996	15.2	1.9	40.5	12	2003	22.4	13.7	27.3	6	2004	17.5	6.3	33.7	13					
1997	11.2	4.9	18.3	12	2004	22.2	11.4	34.9	11	2005	14.3	3.7	27.3	8					
1998	13.6	3.1	28.9	11	2005	20.5	4.4	32.6	8	2006	18.2	6.1	33.2	12					
1999	21.5	11.3	35.6	12	2006	19.5	6.0	30.3	10	2007	24.2	10.1	38.4	12					
2000	26.6	20.3	32.3	12	2007	23.0	8.5	39.7	11	2008	18.6	8.9	35.3	12					
2001	25.7	20.4	30.8	12	2008	18.0	11.1	28.7	11	2009	21.1	4.3	37.9	10					
2002	19.3	6.3	26.4	12	2009	20.6	12.8	33.0	9	2010	16.5	0.0	27.1	10					
2003	13.4	3.5	20.6	12	2010	17.8	7.3	24.7	11										
2004	12.2	7.9	19.4	12															
2005	22.2	15.0	34.1	12															
2006	14.0	8.0	21.9	12															
2007	11.9	7.4	15.7	12															
2008	12.4	2.3	17.0	12															
2009	8.7	6.0	11.0	11															
2010	17.7	8.5	29.1	11															
total	15.9	1.5	40.5	254	total	18.5	3.2	39.7	137	total	16.1	0.0	38.4	144	total	13.1	1.2	27.4	65

*Separate values for transects walked in the territory of the South and North chimpanzee community. Only years with min 6 months of data collection are included. Means at last row concern weighted means.

Table S3 The lowest, highest and average monthly percentage of monitored trees that bore young leaves per year in Kanyawara, Tai and Loango forest

PERCENTAGE OF CHIMPANZEE FOOD TREES THAT BEARS YOUNG LEAVES

Kanyawara (East Africa)					Tai South* (West Africa)					Tai North* (West Africa)					Loango (Central Africa)				
Year	Mean	Lowest	Highest	months	Year	Mean	Lowest	Highest	months	Year	Mean	Lowest	Highest	months	Year	Mean	Lowest	Highest	months
1990	80.4	31.4	99.1	12	1997	97.0	95.9	99.2	6	1997	80.2	14.3	99.3	11	2006	21.7	2.8	79.8	6
1991	95.8	90.5	99.1	12	1998	68.4	49.0	93.5	9	1998	62.7	54.7	75.4	12	2007	20.6	0.0	67.9	12
1992	96.9	91.8	99.6	12	1999	49.4	35.9	67.4	12	1999	55.9	37.1	70.8	12	2008	15.7	7.9	29.6	12
1993	96.9	89.4	99.7	12	2000	59.2	49.6	78.9	12	2000	54.8	4.2	78.9	12	2009	13.5	3.0	26.3	12
1994	97.1	84.1	99.8	12	2001	51.5	35.1	69.8	10	2001	55.1	35.8	83.5	10	2010	18.6	5.1	37.7	11
1995	95.8	84.6	99.7	12	2002	42.6	29.0	68.6	11	2002	47.0	33.7	74.2	10	2011	34.7	18.3	50.4	12
1996	97.2	91.9	100.0	12	2003	47.4	33.9	63.3	6	2004	50.8	22.7	81.7	12					
1997	98.7	96.6	100.0	12	2004	52.8	32.7	67.7	11	2005	40.7	30.2	54.8	8					
1998	97.3	90.2	100.0	11	2005	55.7	45.6	65.8	8	2006	58.9	30.8	78.3	12					
1999	90.7	65.5	99.3	12	2006	56.0	42.3	65.4	10	2007	57.4	36.1	74.9	12					
2000	92.8	81.0	100.0	12	2007	46.4	31.5	75.0	11	2008	61.9	51.4	76.0	12					
2001	94.8	89.9	99.4	12	2008	42.1	26.6	63.1	11	2009	53.4	41.0	69.1	10					
2002	88.8	80.6	96.6	12	2009	49.9	34.4	66.5	9	2010	42.1	0.0	57.7	11					
2003	82.1	71.4	90.8	12	2010	50.5	37.1	57.8	10										
2004	84.9	70.9	94.3	12															
2005	86.3	76.1	94.2	12															
2006	84.1	65.4	94.9	12															
2007	89.5	78.7	97.0	12															
2008	88.1	77.0	98.5	12															
2009	93.2	88.1	98.2	11															
2010	94.2	90.9	98.1	11															
total	91.7	31.4	100.0	249	total	53.5	26.6	99.2	136	total	55.9	0.0	99.3	144	total	20.7	0.0	79.8	65

*Separate values for transects walked in the territory of the South and North chimpanzee community. Only years with min 6 months of data collection are included. Means at last row concern weighted means.

Fig. S1. The encounter rates of ripe and unripe fruit crops in an old growth rain forest. The open and filled squares represent the average number of trees found along one km of transect in the old growth forest of the Kanyawara chimpanzee community that bore ripe or unripe fruit crop, respectively.

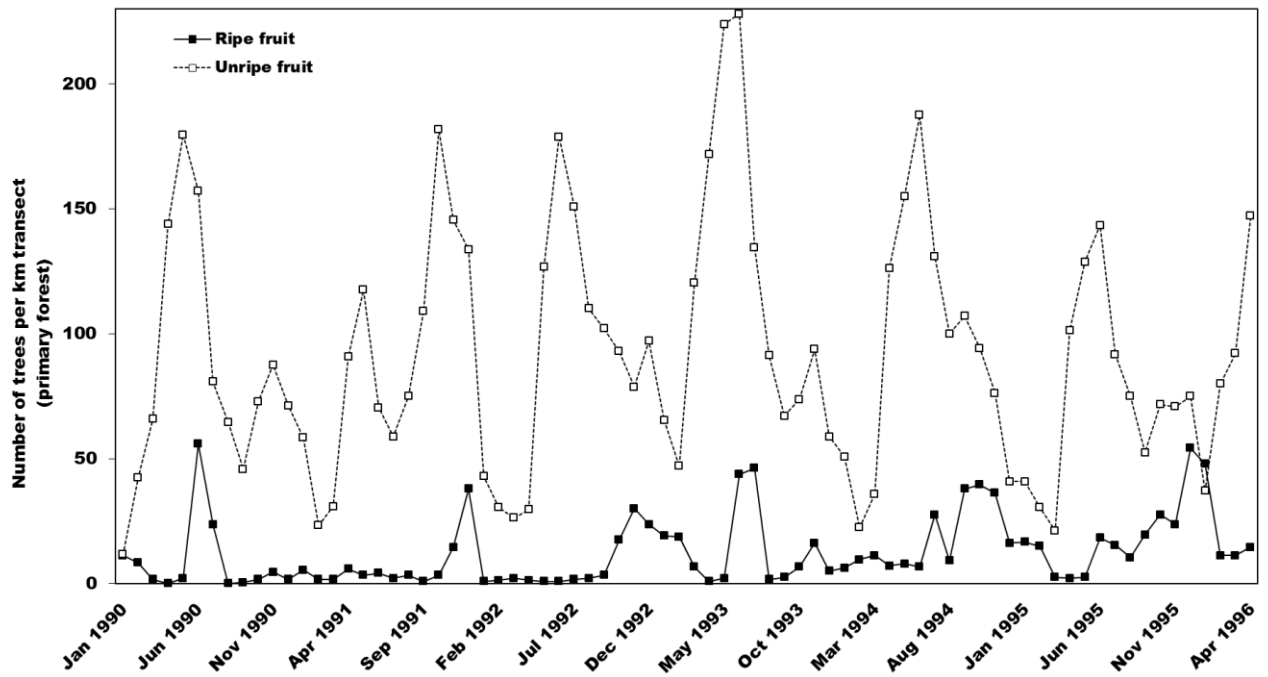


Fig. S2. Intra-specific unripe fruit synchrony levels by species at each of the three sites.

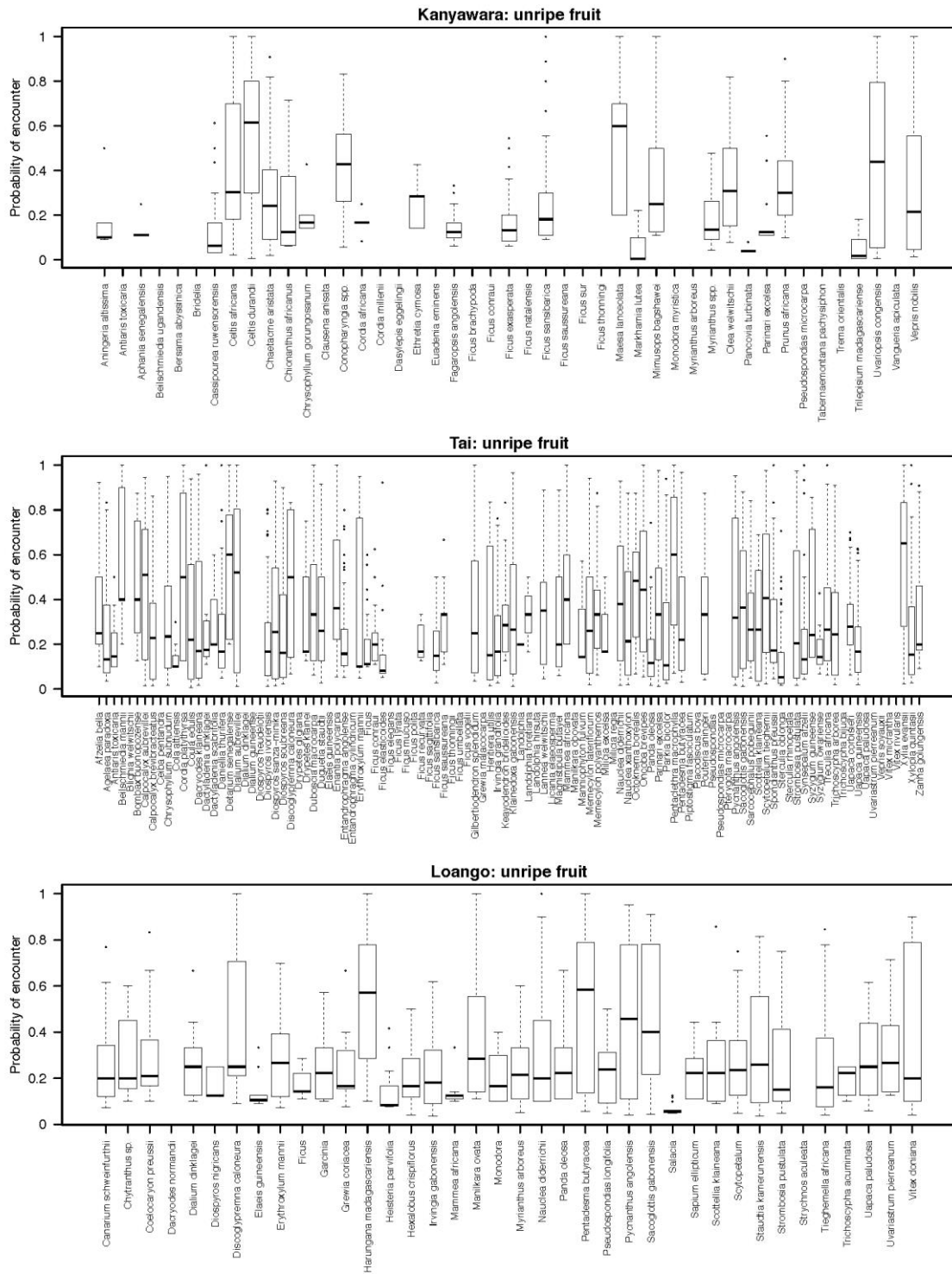


Fig. S3 Intra-specific young leaf synchrony levels by species at each of the three sites.

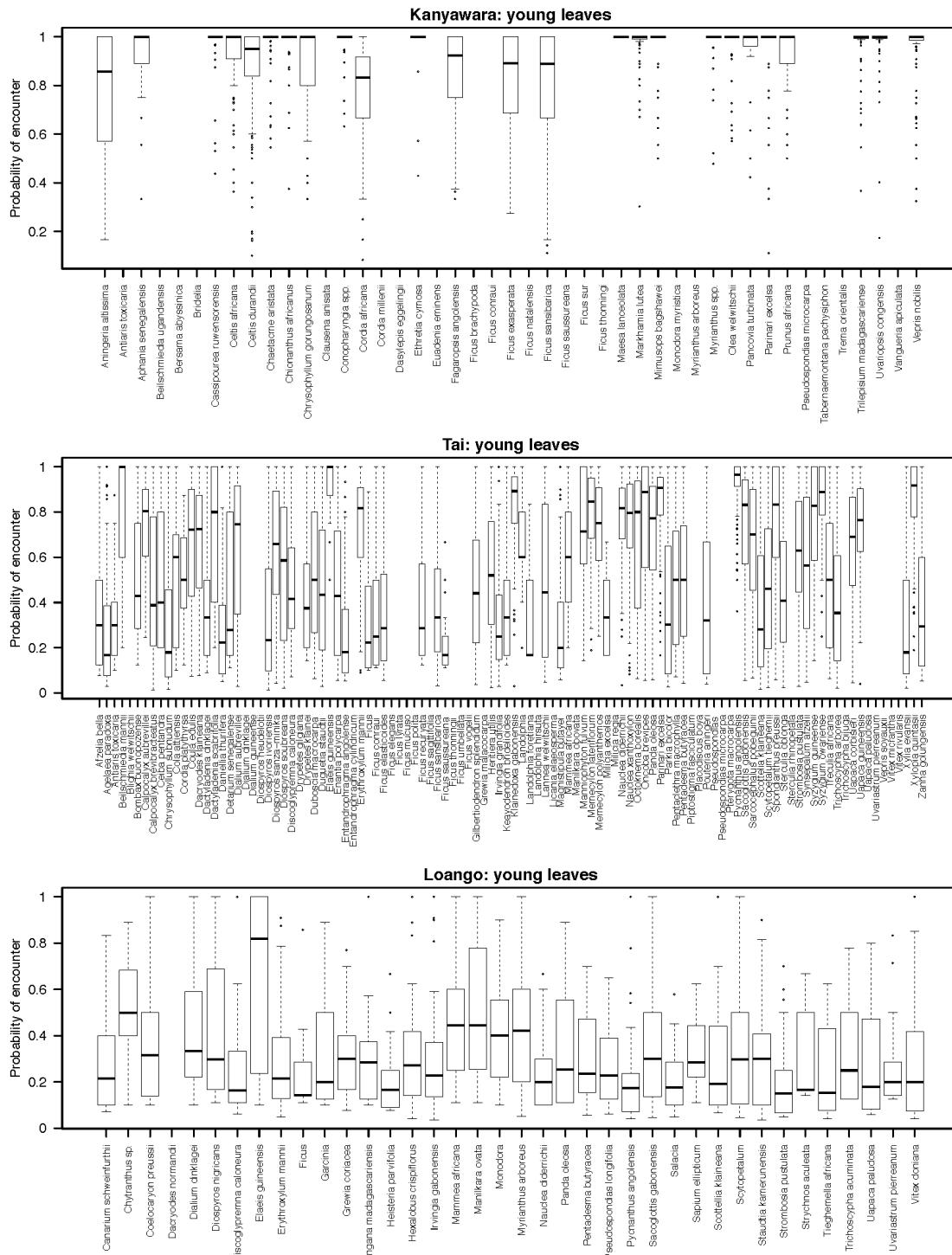


Fig. S4. Fluctuating synchrony levels across years. The Y-axis represents the fruiting records of the same tree individuals that were monitored monthly for periods of up to 13 years in the Kanyawara and Tai forest. Black and grey dots represent ripe fruit presence and absence, respectively; no dot represents missing data. The size of the dots are proportional to the fruit production scores; blank white spaces denote no data collected.

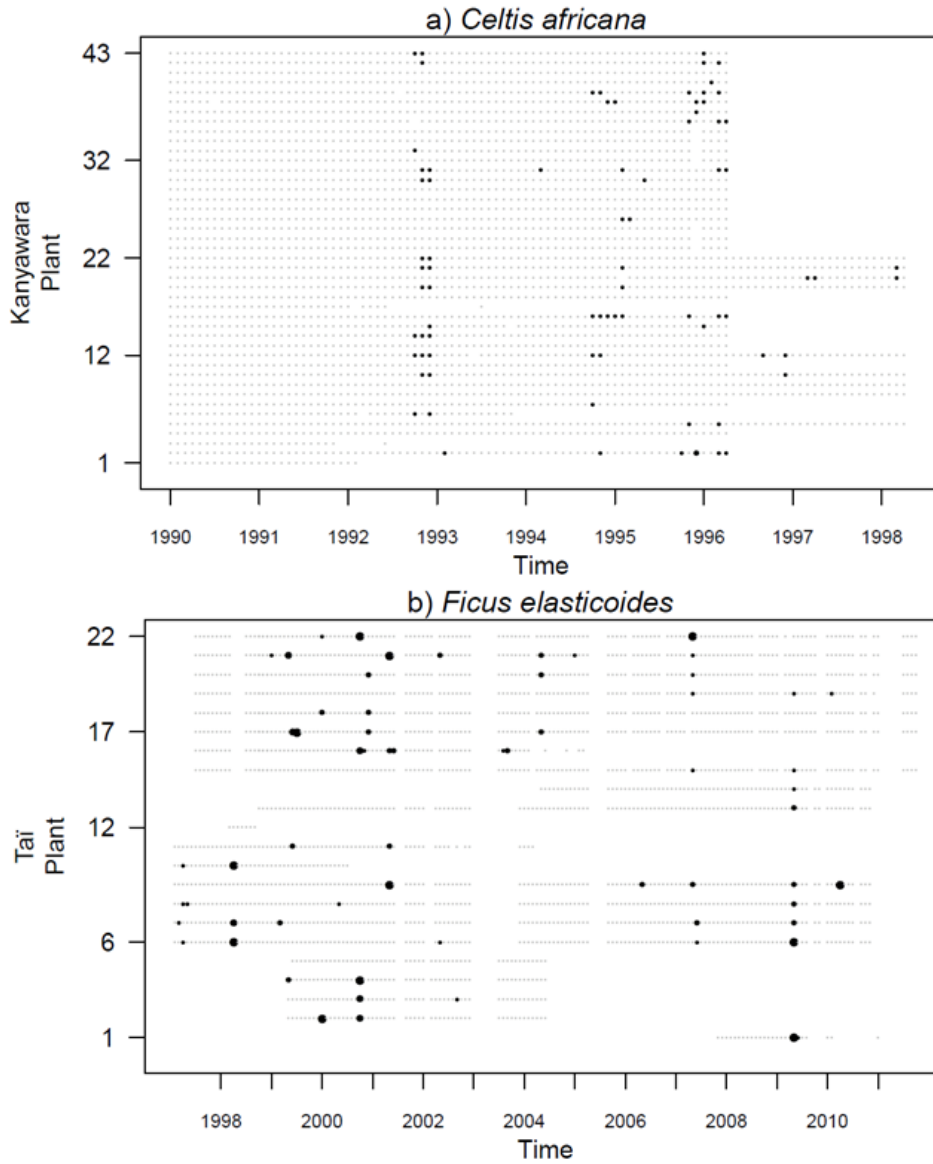


Fig. S5. Species can exhibit different temporal patterns of fruit availability. Fruiting seasons can occur at different frequencies a) bi-annual, (*Nauclea diderrichii*), b) annual (*Xylocarpus evansii*) and c) supra-annual (*Heritiera utilis*). The Y-axis represents the fruiting records of the same tree individuals that were monitored monthly for periods of up to 13 years in the Tai forest. Black and grey dots represent ripe fruit presence and absence, respectively; no dot represents missing data. The size of the dots are proportional to the fruit production scores; blank white spaces denote no data collected.

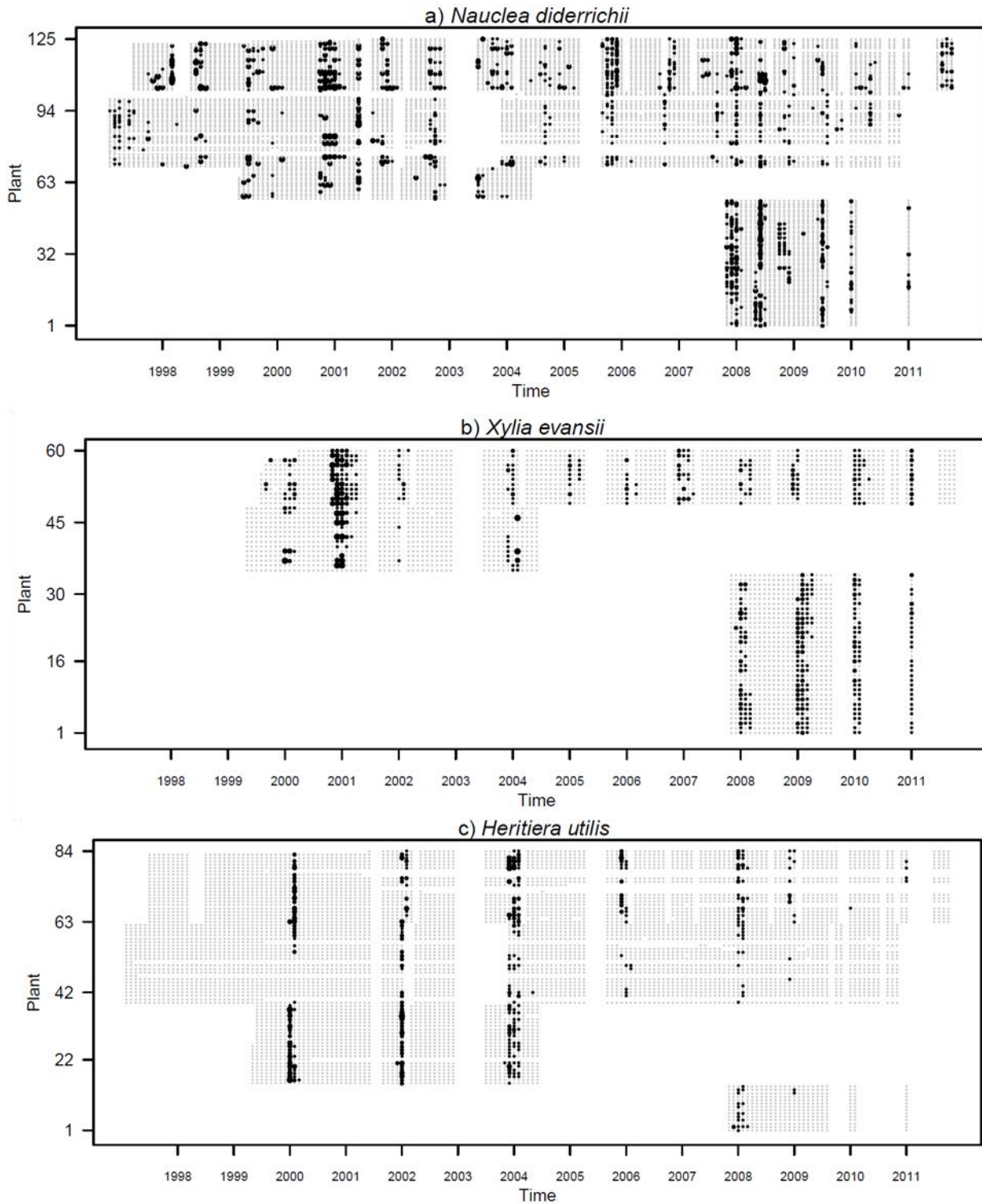


Fig. S6 Fruiting frequencies differ between individual trees. The Y-axis represents the fruiting records of the same tree individuals that were monitored monthly for periods of up to 13 years in the Kanyawara and Tai forest. Black and grey dots represent ripe fruit presence and absence, respectively; no dot represents missing data. The size of the dots are proportional to the fruit production scores; blank white spaces denote no data collected.

