

Duthie, A. B. and Nason, J. D. 2016. Plant connectivity underlies plant-pollinator-exploiter distributions in *Ficus petiolaris* and associated pollinating and non-pollinating fig wasps. – Oikos doi: 10.1111/oik.02905

## Appendix 1

Here we present tables showing analyses for eight multiple regressions for mean per syconium pollinator foundresses arrival counts, pollinator production, non-pollinator production, and seed production at the level of individual crops of the Sonoran Desert rock fig *Ficus petiolaris*. Table A1–A4 report analyses in which the effect of fig tree spatial connectivity ( $r_n$ ) is estimated for its effects on foundress counts (Table A1), pollinator production (Table A2), non-pollinator production (Table A3), and seed production (Table A4). Similarly, Tables A5–A8 report analyses in which the number of neighbouring fig trees within a defined radius ( $r_a$ ) is estimated for its effects on foundress counts (Table A5), pollinator production (Table A6), non-pollinator production (Table A7), and seed production (Table A8). In all analyses using the number of neighbouring fig trees within a defined radius, Neighbours<sup>2</sup> represents a quadratic squared term of neighbour in each model.

We also include Fig. A1 which illustrates how pollinator production increases asymptotically with increasing foundress number at the level of individual syconia.

Table A1. Counts of arriving pollinator foundresses in *Ficus petiolaris* syconia as a function of local fig density within four different tree connectivities ( $r_n$ ) defined as the distance to the nearest  $n$ th neighbouring *F. petiolaris* tree. Data were collected between 2007–2013 from a total of 859 syconia on 80 unique *F. petiolaris* crops in Baja, California. Covariates include the mean volume (Volume) and latitude (Latitude) of syconia from which foundresses were collected. Table elements show regression coefficients for each variable, and significance levels are indicated at the 0.05 (\*), 0.01 (\*\*), and 0.001 (\*\*\*) levels. Elements with ``NS" were not significant.

Distance of the nearest  $n$ th neighbour ( $r_n$ )

Ind. variable	$r_n = 5$	$r_n = 10$	$r_n = 20$	$r_n = 40$
Connectivity ( $r_n$ )	0.175**	0.046***	0.032**	0.031**
Volume (mm <sup>3</sup> )	NS	NS	NS	NS
Latitude (°N)	−0.070**	−0.065**	−0.068**	−0.071**

Table A2. Production of pollinator offspring in *Ficus petiolaris* syconia as a function of local fig density within four different tree connectivities ( $r_n$ ) defined as the distance to the nearest  $n$ th neighbouring *F. petiolaris* tree. Data were collected between 2007–2013 from a total of 859 syconia on 80 unique *F. petiolaris* crops in Baja, California. Covariates include the mean volume (Volume) and latitude (Latitude) of syconia from which pollinator offspring were collected, and the mean number of foundress pollinators (Foundresses) per syconia arriving at the crop. Table elements show regression coefficients for each variable, and significance levels are indicated at the 0.05 (\*), 0.01 (\*\*), and 0.001 (\*\*\*) levels. Elements with ``NS" were not significant.

Distance of the nearest  $n$ th neighbour ( $r_n$ )

Ind. variable	$r_n = 5$	$r_n = 10$	$r_n = 20$	$r_n = 40$
Connectivity ( $r_n$ )	NS	NS	NS	NS
Volume (mm <sup>3</sup> )	NS	NS	NS	NS
Latitude (°N)	NS	NS	NS	NS
Foundresses	30.737**	28.773**	29.007**	29.554**

Table A3. Production of non-pollinator offspring in *Ficus petiolaris* syconia as a function of local fig density within four different tree connectivities ( $r_n$ ) defined as the distance to the nearest  $n$ th neighbouring *F. petiolaris* tree. Data were collected between 2007–2013 from a total of 859 syconia on 80 unique *F. petiolaris* crops in Baja, California. Covariates include the mean volume (Volume) and latitude (Latitude) of syconia from which pollinator offspring were collected, the mean number of foundress pollinators (Foundresses) per syconia arriving at the crop, and mean per syconium pollinator production (Pollinators). Table elements show regression coefficients for each variable, and significance levels are indicated at the 0.05 (\*), 0.01 (\*\*), and 0.001 (\*\*\*) levels. Elements with ``NS" were not significant.

Distance of the nearest  $n$ th neighbour ( $r_n$ )

Ind. variable	$r_n = 5$	$r_n = 10$	$r_n = 20$	$r_n = 40$
Connectivity ( $r_n$ )	NS	NS	NS	NS
Volume (mm <sup>3</sup> )	NS	NS	NS	NS
Latitude (°N)	NS	NS	NS	NS
Foundresses	NS	NS	NS	NS
Pollinators	-0.141**	-0.131**	-0.132**	-0.134**

Table A4. Production of seeds in *Ficus petiolaris* syconia as a function of local fig density within four different tree connectivities ( $r_n$ ) defined as the distance to the nearest  $n$ th neighbouring *F. petiolaris* tree. Data were collected between 2007–2013 from a total of 120 syconia on 11 unique *F. petiolaris* crops in Baja, California. Covariates include the mean volume (Volume) and latitude (Latitude) of syconia from which pollinator offspring were collected, the mean number of foundress pollinators (Foundresses) per syconia arriving at the crop, and mean per syconium pollinator (Pollinators) and non-pollinator (Non-pollinators) production. Table elements show regression coefficients for each variable, and significance levels are indicated at the 0.05 (\*), 0.01 (\*\*), and 0.001 (\*\*\*) levels. Elements with ``NS" were not significant.

Distance of the nearest  $n$ th neighbour ( $r_n$ )

Ind. variable	$r_n = 5$	$r_n = 10$	$r_n = 20$	$r_n = 40$
Connectivity ( $r_n$ )	NS	NS	NS	NS
Volume (mm <sup>3</sup> )	0.035*	0.055**	0.044*	0.046*
Latitude (°N)	NS	-0.021**	-0.030*	-0.029*
Foundresses	0.711*	0.860**	0.711*	0.716*
Pollinators	NS	-0.458*	-0.527*	-0.513*
Non-pollinators	-3.128*	-2.728*	-3.450*	-3.303*

Table A5. Counts of arriving pollinator foundresses in *Ficus petiolaris* syconia as a function of the number of neighbouring figs within an  $r_a$  km radius. Data were collected between 2007–2013 from a total of 859 syconia on 80 unique *F. petiolaris* crops in Baja, California. Covariates include the mean volume (Volume) and latitude (Latitude) of syconia from which foundresses were collected. Table elements show regression coefficients for each variable, and significance levels are indicated at the 0.05 (\*), 0.01 (\*\*), and 0.001 (\*\*\*) levels. Elements with ``NS" were not significant.

Neighbouring figs within an  $r_a$  km radius

Ind. variable	$r_a = 0.1$ km	$r_a = 0.5$ km	$r_a = 1$ km	$r_a = 2$ km
Neighbours ( $r_a$ )	NS	0.023***	0.017***	0.009*
Neighbours <sup>2</sup> ( $r_a$ )	NS	−0.0002***	−0.0001**	NS
Volume (mm <sup>3</sup> )	NS	NS	NS	NS
Latitude (°N)	−0.074	−0.078**	−0.094***	−0.089**

Table A6. Production of pollinator offspring in *Ficus petiolaris* syconia as a function of the number of neighbouring figs within an  $r_a$  km radius. Data were collected between 2007–2013 from a total of 859 syconia on 80 unique *F. petiolaris* crops in Baja, California. Covariates include the mean volume (Volume) and latitude (Latitude) of syconia from which pollinator offspring were collected, and the mean number of foundress pollinators (Foundresses) per syconia arriving at the crop. Table elements show regression coefficients for each variable, and significance levels are indicated at the 0.05 (\*), 0.01 (\*\*), and 0.001 (\*\*\*) levels. Elements with ``NS" were not significant.

Neighbouring figs within an  $r_a$  km radius

Ind. variable	$r_a = 0.1$ km	$r_a = 0.5$ km	$r_a = 1$ km	$r_a = 2$ km
Neighbours ( $r_a$ )	NS	1.074*	NS	NS
Neighbours <sup>2</sup> ( $r_a$ )	NS	−0.012*	NS	NS
Volume (mm <sup>3</sup> )	NS	NS	NS	NS
Latitude (°N)	NS	NS	NS	NS
Foundresses	31.577***	24.984**	27.760**	32.427***

Table A7. Production of non-pollinator offspring in *Ficus petiolaris* syconia as a function of the number of neighbouring figs within an  $r_a$  km radius. Data were collected between 2007–2013 from a total of 859 syconia on 80 unique *F. petiolaris* crops in Baja, California. Covariates include the mean volume (Volume) and latitude (Latitude) of syconia from which pollinator offspring were collected, the mean number of foundress pollinators (Foundresses) per syconia arriving at the crop, and mean per syconium pollinator production (Pollinators). Table elements show regression coefficients for each variable, and significance levels are indicated at the 0.05 (\*), 0.01 (\*\*), and 0.001 (\*\*\*) levels. Elements with ``NS" were not significant.

Neighbouring figs within an  $r_a$  km radius

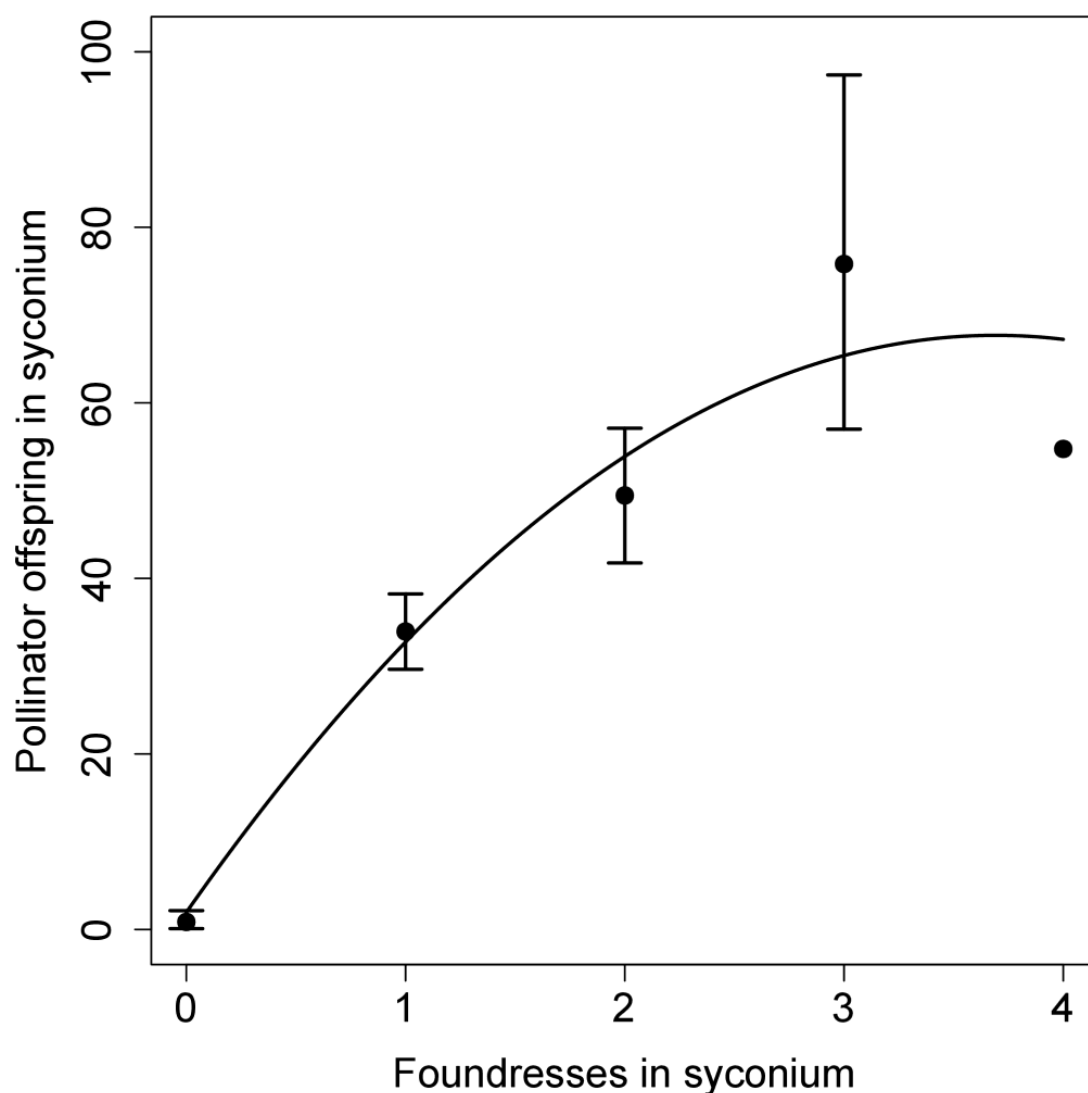
Ind. variable	$r_a = 0.1$ km	$r_a = 0.5$ km	$r_a = 1$ km	$r_a = 2$ km
Neighbours ( $r_a$ )	0.723*	NS	NS	NS
Neighbours <sup>2</sup> ( $r_a$ )	−0.026**	NS	NS	NS
Volume (mm <sup>3</sup> )	NS	NS	NS	NS
Latitude (°N)	NS	NS	NS	NS
Foundresses	NS	NS	NS	NS
Pollinators	−0.149**	−0.165*	−0.144**	−0.136**

Table A8. Production of seeds in *Ficus petiolaris* syconia as a function of the number of neighbouring figs within an  $r_a$  km radius. Data were collected between 2007–2013 from a total of 120 syconia on 11 unique *F. petiolaris* crops in Baja, California. Covariates include the mean volume (Volume) and latitude (Latitude) of syconia from which pollinator offspring were collected, the mean number of foundress pollinators (Foundresses) per syconia arriving at the crop, and mean per syconium pollinator (Pollinators) and non-pollinator (Non-pollinators) production. Table elements show regression coefficients for each variable, and significance levels are indicated at the 0.05 (\*), 0.01 (\*\*), and 0.001 (\*\*\*) levels. Elements with ``NS" were not significant.

Neighbouring figs within an  $r_a$  km radius

Ind. Variable	$r_a = 0.1$ km	$r_a = 0.5$ km	$r_a = 1$ km	$r_a = 2$ km
Neighbours ( $r_a$ )	NS	NS	NS	NS
Neighbours <sup>2</sup> ( $r_a$ )	NS	NS	NS	NS
Volume (mm <sup>3</sup> )	0.049*	0.049*	0.053*	0.057*
Latitude (°N)	−0.029*	−0.018*	−0.026*	−309.9*
Foundresses	0.823*	0.718*	0.854*	94.705*
Pollinators	NS	NS	NS	NS
Non-pollinators	−2.637*	−2.748*	−2.593*	NS

Figure A1. Mean number of pollinator offspring collected from syconia against the number of foundresses observed within the syconia. The solid line illustrates the model:  $\text{Pollinator\_Count} = \text{Intercept} + \text{Foundress\_Count} + \text{Foundress\_Count}^2$ , where  $\text{Foundress\_Count}^2$  is a quadratic term. Both  $\text{Foundress\_Count}$  (Est. = 35.6;  $p < 0.001$ ) and  $\text{Foundress\_Count}^2$  (Est. = -4.8;  $p = 0.002$ ) are significant, but Intercept is not ( $p > 0.1$ ). Error bars show 95% bootstrapped confidence intervals around mean pollinator values. Sampling includes 853 syconia with non-missing pollinator and foundress estimates. Three outliers with especially high foundress counts (7, 7, 10) are not shown.



## Appendix 2

A video showing active pollination is supplied as a separate file