

Appendix 3. Offspring sex ratios in gynodioecious species reflect the transmission of sex-determining genes to the next generation. Under largely stable sex ratios of adult populations, offspring sex ratios may thus provide insight into the potential relative contributions of females and hermaphrodites via their female reproductive function to the next generation. We calculated hypothetical maternal fitness of hermaphrodites relative to the fitness of females from sex-ratio data using a formula accounting for the frequency of the two sex types in adult populations (Couvet *et al.*, 1986; modified):

$$A' = (RMF_H \times A \times H + (1 - A) \times F) / (RMF_H \times A + 1 - A),$$

where A' is the expected adult sex ratio in the next generation, A the observed sex ratio of the adult population, F the sex ratio in the offspring of females, H the sex ratio in the offspring of hermaphrodites and RMF_H the relative maternal fitness of hermaphrodites as compared to females. Under a stable population sex ratio ($A' = A$) and assuming that there are no differences in survival rate between females and hermaphrodites and between the offspring of female and hermaphrodite mothers (scenario A), expected RMF_H (seed production and germination success) may be derived from the above formula. However, in *Thymus praecox*, a molecular genetic analysis revealed that more than one third of the seeds of open-pollinated hermaphrodites are self-fertilised and that selfed offspring fail to reach reproductive maturity under natural conditions (Landergott, 2007). In addition, flower size variation among adult females and female offspring of hermaphrodites suggests that hermaphrodite mothers may hardly contribute any females to adult populations in *T. praecox* (Landergott, unpubl. data). It appears therefore sensible to assume that the offspring of female seed-parents will primarily build the next generation and that hermaphrodite mothers mainly contribute hermaphrodite offspring ($H = 1$ and $A' = A$; scenario B).

The table below shows hypothetical RMF_H values in *T. praecox* at contrasting altitudes under scenarios A and B. Because of small sample sizes underlying our offspring sex ratio estimates, we pooled the data from regions L, P and S, but treated region Z separately (see Results and Discussion). Furthermore, for population PL, an offspring sex ratio estimate from controlled self-pollinations and within-population outcrosses on hermaphrodites (average proportion of hermaphrodites = 0.88; Landergott, 2007) was used due to limited samples of open-pollinated offspring.

Region	Altitude	Proportion of hermaphrodites			Hypothetical relative maternal fitness of hermaphrodites (RMF_H) if $A' = A$	
		Adults (A)	Offspring of Hermaphrodites (H)	Females (F)	Scenario A	Scenario B
Average (L, P, S)	High	0.52	0.82	0.45	0.22	0.14
	Low	0.62	0.81	0.42	0.65	0.32
Z	High	0.48	0.65	0.31	1.06	0.30
	Low	0.67	0.79	0.47	0.81	0.35

Irrespective of scenario, these hypothetical values indicate that hermaphrodites should exhibit lower relative maternal fitness at high as compared with low altitudes in *T. praecox*. In contrast, for study region Z, our calculations suggest that no altitudinal difference in relative maternal fitness of the two sex types is required to maintain the observed sex-ratio difference between populations ZH and ZL. The comparison of the two hypothetical scenarios of offspring survival finally stresses the importance of understanding survival in relation to maternal sex and offspring sex type in *T. praecox*.