**Fig. S4** Correlation between ln(total seed yield) and ln(total aboveground biomass) for the cereal and pulse species. The mean values of the raw data are plotted. $R^2 = 0.86$, $P < 0.0001$.

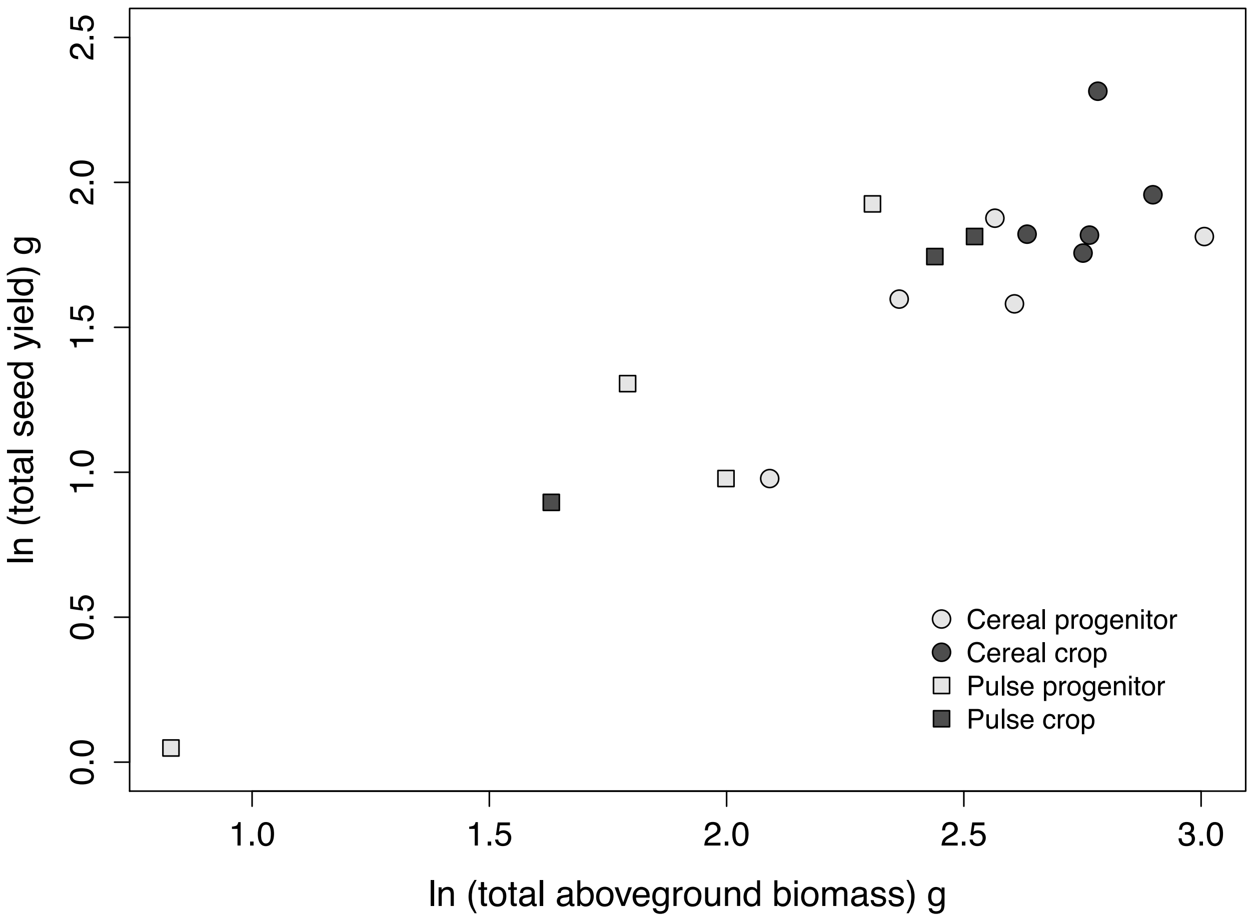


**Fig. S5** Correlation between ln(total seed yield) and ln(individual seed mass) for the cereal and pulse species. The mean values of the raw data are plotted. $R^2 = 0.54$, $P < 0.001$.

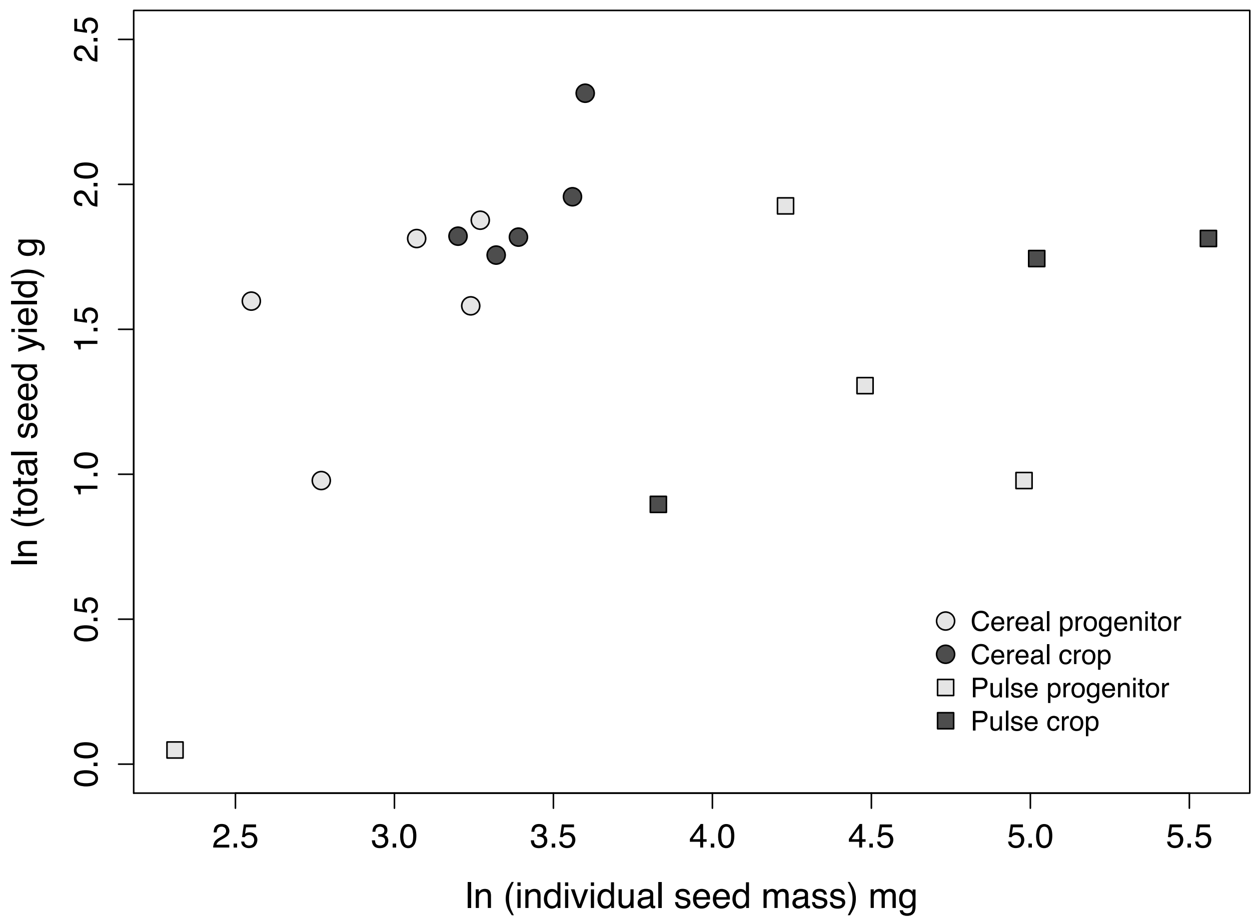
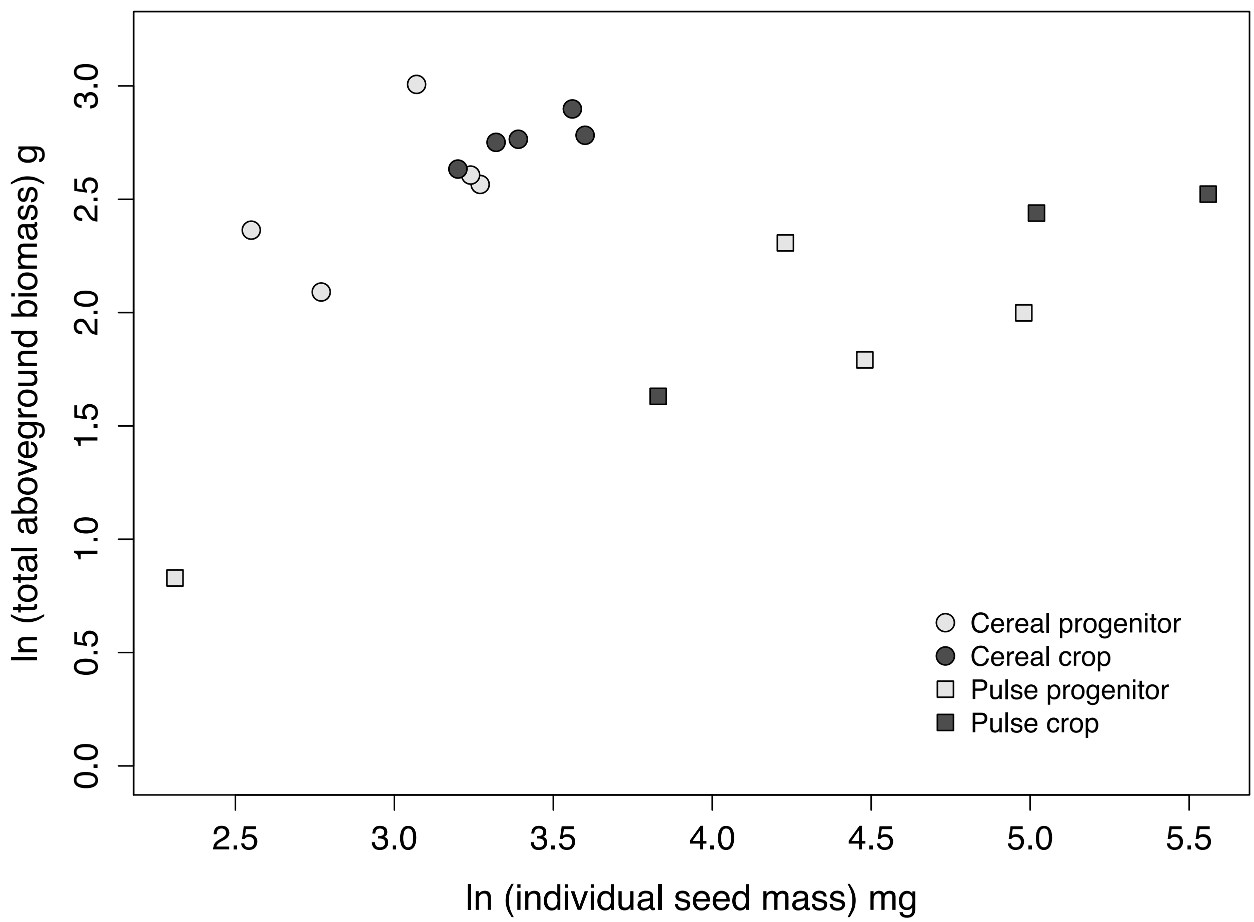


**Fig. S6** Correlation between ln(total aboveground biomass) and ln(individual seed mass) for the cereal and pulse species. The mean values of the raw data are plotted. $R^2 = 0.60$, $P < 0.001$.



**Appendix S1** A brief description of the variance approximation used for the variance decomposition analysis.

Assume we want to approximate the variance of some function $f(x, y)$ where $x$ and $y$ are random variables with means $\mu_x, \mu_y$ and the variances and covariance given by $V(x), V(y)$ and $C(x, y)$ respectively.

The standard first order Taylor approximation of $f(x, y)$ evaluated at the means is

$$f(x, y) \approx f(\mu_x, \mu_y) + \frac{\partial f(x, y)}{\partial x}(x - \mu_x) + \frac{\partial f(x, y)}{\partial y}(y - \mu_y)$$

Taking variances of this expression we get

$$V(f(x, y)) \approx \left(\frac{\partial f(x, y)}{\partial x}\right)^2 V(x) + \left(\frac{\partial f(x, y)}{\partial y}\right)^2 V(y) + 2\frac{\partial f(x, y)}{\partial x}\frac{\partial f(x, y)}{\partial y}C(x, y)$$

where all the partial derivatives are evaluated at $\mu_x, \mu_y$. This is the standard delta method approximation to the variance of a function.