Supplementary File 5. Parametrisation of population models of experimental mowing treatments

$$SB(t+1) = SB(t)\,\sigma\,(1-\rho) +$$

$$SB(t)\,\sigma\,\rho\,\varphi(x) \int_{min}^{max} s(x)\,g(y,x,\boldsymbol{m})\,nx(x)dx \int_{min}^{max} fl(y,\boldsymbol{m})\,fec(y,\boldsymbol{m})\,\Sigma(sr(y,\boldsymbol{m})\,sv(sr,\boldsymbol{m}))\,ny(y)\,dy\ [2]$$

Mowing treatment $\boldsymbol{m}$ is a factorial variable with one level for each of the experimental mowing treatments (i.e. 69, 89, 679, or 689). Mowing effects on growth g, flowering fl, fecundity fec, and seed ripening sr were derived from the mowing experiment (details in Supplementary File 1), mowing effects on seed viability sv from the post-harvest seed quality experiment (details in main text, "Post-harvest seed quality experiment")Specifically, growth of plants subjected to a mowing treatment m was modelled as $g(y,x,m) = g(y,x)\frac{y_m}{y_c}$, where heights in September y of the reference models $g(y,x)$ were corrected by the constant$\frac{y_m}{y_c}$. This constant represents the relative change in height in September due to the mowing treatment (Fig. 2A), calculated as the estimated height x_m in the mowing treatment m over the estimated height x_c in the control treatment of the mowing experiment. Flowering under mowing treatment m was modelled as $(y,m) = fl(y)\frac{fl_m(y)}{fl_c(y)}$, where flowering probability of the reference model $fl(y)$ was corrected by a size-specific constant $\frac{fl_m(y)}{fl_c(y)}$ representing the relative flowering probability of treatment$m$, $fl_m(y)$, compared to that of the control treatment $fl_c(y)$ in the mowing experiment (Fig. 2B). Similarly, fecundity under mowing treatment $m$was modelled as $fec(y,m) = fec(y)\frac{fec_m(y)}{fec_c(y)}$, correcting fecundity of the reference model $fec(y)$ by the relative fecundity of plants in the mowing treatment $fec_m(y)$ to that of plants in the control treatment $fec_c(y)$ (Fig.2C). Seed ripening $sr(y,m)$ was predicted as a function of plant height in September y and treatment m by the multinomial model of the mowing experiment (Fig. 2D). The post-harvest seed quality experiment provided the global estimates of seed viability for each seed developmental stage $sv(sr)$ after mowing as 0, 0.35, and 0.87 for viability of flowers, developing seeds, and ripe seeds respectively (i.e. the same for each mowing regime, but different from the control where all have a viability of 0.87).

The remaining parameters were parameterised as in equation 1 (i.e. they remained unchanged, see Supplementary File 4).