

$$\frac{dG_w}{dt} = r_{G_w} \left(1 - \frac{G_w}{K_G} \right) - \frac{a_C G_w}{b_C + G_w} \left(\frac{C}{w} \right) - t_B \frac{a_B G_w}{b_B + G_w} B - \frac{a_R G_w}{b_R + G_w} R$$

$$\frac{dG_d}{dt} = r_{G_d} \left(1 - \frac{G_d}{K_G} \right) - t_B \frac{a_B G_d}{b_B + G_d} B - \frac{a_R G_d}{b_R + G_d} R$$

$$\frac{dB}{dt} = \varepsilon_B \left(t_B w \frac{a_B G_w}{b_B + G_w} + (1 + t_B)(1 - w) \frac{a_B G_d}{b_B + G_d} \right) B - d_B B$$

$$\frac{dR}{dt} = \varepsilon_R \left(w \frac{a_R G_w}{b_R + G_w} + (1 - w) \frac{a_R G_d}{b_R + G_d} \right) R \left(1 - \frac{R}{K_R} \right) - d_R R - \frac{a_K R}{b_K + R} Y$$

$$\frac{dY}{dt} = \varepsilon_K \left(\frac{a_K R}{b_K + R} + a_D \left(1 - \frac{R}{b_K + R} \right) \right) Y - d_Y Y$$