We have $z_{n+1} = a + b z_n + c z_n^2$ with $c \neq 0$.

Let $z = w/c - b/(2c)$ \implies

$$z_{n+1} = w_n/c - b/(2c) \implies$$

$$w_{n+1}/c - b/(2c) = a + b \left[ w_n/c - b/(2c) \right] + c \left[ w_n/c - b/(2c) \right]^2$$

$$\implies w_{n+1} = \frac{b}{a} + ac + b \left[ w_n - b/2 \right] + \left[ w_n - b/2 \right]^2$$

$$= \frac{b}{a} + ac + bw_n - \frac{b^2}{2} + w_n^2 - bw_n + \frac{b^2}{4}$$

$$= w_n^2 + (ac + \frac{b}{2} - \frac{b^2}{4})$$

$$\implies w_{n+1} = w_n^2 - \left( \frac{b^2}{4} - \frac{b}{2} - ac \right)$$

$$\implies w_{n+1} = w_n^2 - \mu$$

with

$$\mu = \frac{b^2}{4} - \frac{b}{2} - ac$$