



Figure 1 Plant, flowers, dried fruitlet of *R. chingii* Hu (Fu-Pen-Zi) and related Chinese medicines (Adopted from He et al., 2023)
Image caption: (A) Plant of *R. chingii* Hu, (B) Flowers, (C) WuziYanzong Pill, and (D) Dried fruitlet (Fu-Pen-Zi) (Adopted from He et al., 2023)

2.3 Effects of integrated water and fertilizer regulation on plant growth performance and stress resistance

Integrated water and fertilizer regulation usually has a stronger effect on plant performance than changing either factor alone because growth, nutrient absorption, and photosynthesis are jointly controlled by soil moisture and nutrient availability (Kazemalilou et al., 2021). In melon, irrigation, fertilization, and their interaction all significantly affected yield and quality, and the W2F2 treatment most effectively promoted total dry mass, while structural equation analysis showed that photosynthesis influenced yield and quality mainly through dry matter accumulation and growth (Yang et al., 2023). In capsicum, moderate irrigation and nitrogen supply produced the highest plant height, branch number, fruit weight, and nitrogen-use efficiency, with the I2N2 treatment giving the best overall performance (Sharma et al., 2025). Pear studies similarly found that suitable coupling treatments improved root growth, leaf area index, fruit development, and yield, indicating that coordinated supply better supports whole-plant growth than single-factor adjustment (Li et al., 2024).

Integrated regulation is also important for stress resistance, especially under water deficit. In bitter melon, reduced irrigation decreased fruit number, fruit weight, chlorophyll, and leaf phosphorus, while increasing electrolyte leakage and malondialdehyde, but AMF inoculation and phosphorus fertilizer reduced membrane damage and improved fruit weight under all irrigation levels (Dolatmand-Shahri et al., 2025). In lemon balm, combining compost, biochar, NPK fertilizer, and beneficial microbes significantly improved chlorophyll content, photosynthesis, stomatal conductance, antioxidant activity, and biomass under moderate drought, with integrated treatments increasing biomass by 2.31~2.76 times relative to the stressed control (Bolhassani et al., 2024). Tomato