Table 1 Traceable effect benchmarks from recent chrysanthemum/Hangbaiju-relevant biological control studies.
(Values are reported outcomes from cited sources; they are not newly generated data.)

Control category	Target problem	Example intervention (study context)	Reported effect indicator	Practical note for Hangbaiju adoption
Natural enemy (predatory mite)	Thrips (soil stage contribution)	*Stratiolaelaps scimitus* releases in greenhouse chrysanthemum	74.9% reduction vs. untreated greenhouse by late September	Strong where thrips pupate in soil; complements foliage management and reduces spray dependence during hot seasons (Jung et al., 2019).
Botanical insecticide	Aphids on chrysanthemum (*Aphis gossypii*)	*Chrysanthemum cinerariaefolium* extract, 3.0–3.5 g/L, plastic house	Average efficacy 76% and 72% at 3.0 and 3.5 g/L	Suggests botanicals can deliver operationally meaningful suppression, but consistency and timing are crucial (Hutapea et al., 2024).
Microbial biocontrol (meta-level)	Plant diseases (broad)	Bacillus-based BCAs across studies (2000–2021 synthesis)	~60% disease reduction vs. negative controls	Highlights preventive-strength principle; informs expectation management and program design (Serrão et al., 2024).
Microbial metabolite (Hangbaiju-focused)	Fusarium-related wilt in chrysanthemum	*Streptomyces diastatochromogenes* 1628 metabolites vs. *Fusarium incarnatum*	Protective > therapeutic effects reported in pot trials	Supports preventive use and integration with soil management; direct Hangbaiju relevance (Cao et al., 2019).
Behavioral/physical control (Hangbaiju field)	Bloom-stage aphid contamination risk (*M. sanborni*)	Yellow sticky boards baited with complex aphid sexual attractant; trap spacing 7 m × 8 m	Trapping control effect superior to imidacloprid spray (qualitative superiority claim in abstract)	Especially aligned with bloom-stage “clean product” needs; reduces need for late spraying (Cao et al., 2024).