A clear example of natural-enemy utility is the greenhouse chrysanthemum trial using the soil-dwelling predatory mite *Stratiolaelaps scimitus*. The study describes thrips as difficult to control with chemicals and reports that releases of *S. scimitus* (using a farmer self-production approach) reduced thrips density substantially, with the treated greenhouse showing 74.9% suppression relative to the untreated greenhouse by late September (2018). The authors explicitly interpret this as evidence that soil-dwelling predators can suppress the thrips stage that drops to soil for pupation, an approach that complements foliage-based measures and reduces reliance on repeated sprays.

For Hangbaiju, an equally important natural-enemy concept is "making the field hospitable" to predators and parasitoids. The bloom-stage aphid paper itself highlights that visual and olfactory cues can be leveraged to attract pests into traps; by analogy, ecological regulation can be used to enhance natural-enemy foraging and persistence through habitat features and resource provisioning. In practical IPM, this typically means preserving nectar resources, avoiding broad-spectrum sprays during peak enemy activity, and ensuring that field sanitation removes pest reservoirs without eliminating beneficial refuges (Cao et al., 2024).

3.4 Integrated biological control strategies

In my view, the central question for Hangbaiju is not whether biological control "works," but which integration pattern makes it reliable when weather, labor, and market timing are non-negotiable. The evidence across the cited literature points toward a consistent theme: preventive, combined strategies are more stable than reactive, single-method interventions (Figure 2).

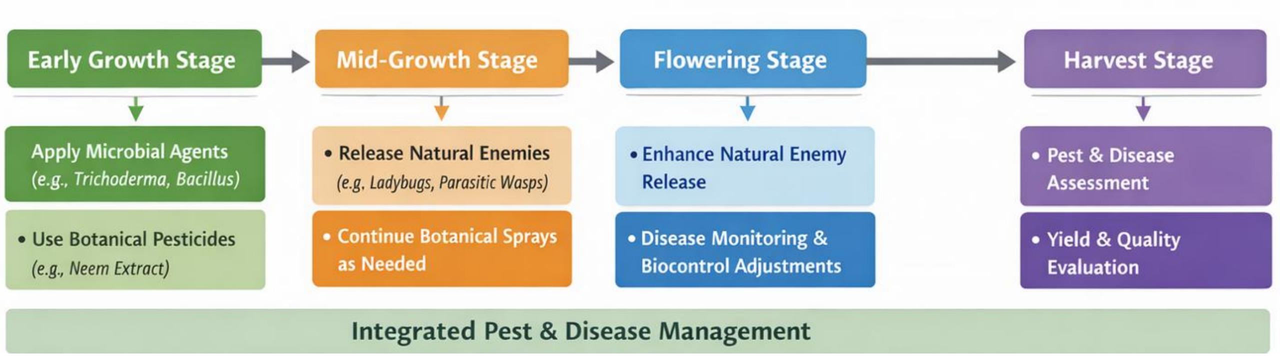

Figure 2 Integrated biological control workflow for Hangbaiju

A useful way to conceptualize this is to treat biological control as a layered system: soil health and preventive microbial inoculation reduce baseline disease pressure; selective botanicals provide flexible suppression tools for sudden pest increases; and natural enemies provide ongoing regulation, especially for pests with cryptic behavior or soil stages. This layered logic is consistent with (i) the Bacillus meta-analysis emphasizing preventive strength, (ii) the Trichoderma–bacteria synergy review emphasizing compatibility and formulation, and (iii) field/greenhouse demonstrations showing strong pest suppression when natural enemy life-history is matched to pest life-cycle vulnerabilities (Serrão et al., 2024).

4 Evaluation of Field Application Effect

4.1 Comparative effectiveness of different control measures

When comparing biological control measures, the most honest approach is to compare "effectiveness profiles" rather than pretending that each tool is measured on the same scale in the same environment. Field outcomes depend on pest species, crop stage, temperature/humidity, application timing, and sometimes the surrounding landscape.

Still, several quantitative anchors are available. In greenhouse chrysanthemum, releases of *Stratiolaelaps scimitus* achieved a reported 74.9% reduction in thrips density relative to the untreated greenhouse by late September. This level of suppression is operationally meaningful, particularly because it targets a soil stage that foliar sprays can miss.