

Establishment of Spider Mite Control Technology Using UV-B Light for Integrated Pest Management in Greenhouse Strawberry

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Development of spider mite management technology other than chemical control is desired because of the serious development of acaricide resistance worldwide. Recent studies have evidenced the lethal effects of ultraviolet-B (UV-B: 280-315 nm) radiation on spider mites. With the aim of developing spider mite control technology using UV-B irradiation, I tested whether UV-B irradiation could suppress the occurrence of spider mites in greenhouse strawberries to which *Tetranychus urticae* was artificially introduced. Since spider mites remain on the lower leaf surfaces, I used light reflection sheets (LRSs) to reflect UV-B irradiated from above. Consequently, the combinations of UV-B lamp and LRS showed an excellent capacity to control *T. urticae* on greenhouse strawberry. Then I optimized the daily cumulative UV-B dose to bring the new technology controlling spider mites with UV-B (UV method) to completion.

However, as strawberry leaves grow densely, UV-B radiation fails to reach the lower leaf surfaces inhabited by spider mites; therefore, I tested the supplementary effect of predatory phytoseiid mites on the UV method. As a result, UV-B irradiation promoted predation on spider mites by phytoseiid mites through increasing the behavioral numerical response, and thus I found that releasing phytoseiid mites efficiently compensated for shortcomings of the UV method. Finally, I conducted an evaluation of the impact of the UV method on strawberry plant and fruit quality in farmer's economical cultivation greenhouses. The UV method improved fruit qualities such as fruit color, soluble solid content (Brix), and fruit hardness. From the above, I have successfully established a novel pest control method that can become a core technology for the integrated pest management (IPM) of spider mites.