**Supplementary materials.**

Abou-Haidar, A., Tawidian, P., Sobh, H., Skinner, M., Parker, B., and Abou- Jawdah, Y. 2021. Efficacy of *Phytoseiulus persimilis* and *Amblyseius swirskii*for integrated pest management for greenhouse cucumbers under Mediterranean environmental conditions. The Canadian Entomologist.

**Table S1.** Details of pesticides applied in the integrated past management and control greenhouses at site A throughout the cucumber growing period. Date of application, active ingredients, rates of application, and target pathogens and pests are indicated for each pesticide used.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Control greenhouse | | | | IPM greenhouse | | | | |
| Spray date (week) | **Active ingredient** | **Rates (mL/L)** | **Target pathogen/pest** | **Spray date (week)** | **Active ingredient** | **Rates (mL/L)** | **Target pathogen/pest** |
| 8 December 2016 (6) | Propamocarb | 3.00 | Downy mildew | 8 December 2016 (6) | Propamocarb | 3.00 | Downy mildew |
| 22 December 2016 (8) | Penconazole | 0.500 | Powdery mildew | 22 December 2016 (8) | Penconazole | 0.500 | Powdery mildew |
| 05 January 2017 (10) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies/Thrips | 18 January 2017 (11) | Acequinocyl | 1.00 | Two-spotted spider mite |
| 18 January 2017 (11) | Acequinocyl | 1.00 | Two-spotted spider mite | 01 February 2017 (14) | Kresoxim-methyl | 0.200 | Downy mildew/Powdery mildew |
| 25 January 2017 (12) | Acequinocyl | 1.00 | Two-spotted spider mite | Thiophanate-methyl | 1.00 | Powdery mildew |
| 01 February 2017 (14) | Carbosulfan | 1.50 | Two-spotted spider mites/Whiteflies/Thrips | 17 February 2017 (16) | Kresoxim-methyl | 0.200 | Downy mildew/Powdery mildew |
| Kresoxim-methyl | 0.200 | Downy mildew/Powdery mildew | Thiophanate-methyl | 1.00 | Powdery mildew |
| Thiophanate-methyl | 1.00 | Powdery mildew | 10 March 2017 (19) | Bifenazate | 0.400 | Two-spotted spider mites |
| 09 February 2017 (15) | Chlorfenapyr | 0.500 | Two-spotted spider mites/Thrips/ Whiteflies | 14 March 2017 (19) | Spirodiclofen | 0.400 | Two-spotted spider mite |
| Hexythiazox | 0.150 | Two-spotted spider mite |  |  |  |  |
| 14 February 2017 (15) | Spinosad | 0.150 | Whiteflies/Thrips |  |  |  |  |
| 17 February 2017 (16) | Kresoxim-methyl | 0.200 | Downy mildew/Powdery mildew |  |  |  |  |
| Thiophanate-methyl | 1.00 | Powdery mildew |  |  |  |  |
| 01 March 2017 (18) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| 10 March 2017 (19) | Bifenazate | 0.400 | Two-spotted spider mites |  |  |  |  |

**Table S2.** Details of pesticides applied in the integrated pest management and control greenhouses at site B throughout the cucumber growing period. Date of application, active ingredients, rates of application, and target pathogens and pests are indicated for each fungicide and insecticide/acaricide used.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Control greenhouse | | | | IPM greenhouse | | | |
| Spray date (week) | **Active ingredient** | **Rates (mL/L)** | **Target pathogen/pest** | **Spray date (week)** | **Active ingredient** | **Rates (mL/L)** | **Target pathogen/pest** |
| 05 November 2016 (3) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies/Thrips | 28 January 2017 (14) | Azoxystrobin | 0.800 | Downy mildew/Powdery mildew |
| Acetamiprid | 0.500 | Whiteflies | Cyflumetofen | 1.00 | Two-spotted spider mite |
| Azoxystrobin | 0.800 | Downy mildew/Powdery mildew | Dimethomorph | 1.00 | Downy mildew |
| Dimethomorph | 1.00 | Downy mildew | Fenhexamid | 1.00 | Botrytis |
| Iprodione | 1.25 | Botrytis | 15 February 2017 (16) | Fosethyl-aluminum | 3.50 | Downy mildew |
| 12 November 2016 (4) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies/Thrips | Thiophanate-methyl | 1.00 | Powdery mildew |
| Azoxystrobin | 0.800 | Powdery mildew | 02 March 2017 (18) | Myclobutanil | 0.120 | Powdery mildew |
| Dimethomorph | 1.00 | Downy mildew |  |  |  |  |
| Esfenvalerate | 0.200 | Whiteflies/ Thrips |  |  |  |  |
| Pyrimethanyl | 1.50 | Botrytis |  |  |  |  |
| 26 November 2016 (6) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| Acetamiprid | 0.500 | Whiteflies |  |  |  |  |
| Chlorfenapyr | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| 03 December 2016 (7) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies |  |  |  |  |
| Chlorfenapyr | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| Penconazole | 0.500 | Powdery mildew |  |  |  |  |
| Pyrimethanyl | 1.50 | Botrytis |  |  |  |  |
| Metalaxyl+Mancozeb | 2.50 | Downy mildew |  |  |  |  |
| 10 December 2016 (8) | Metalaxyl+Mancozeb | 2.50 | Downy mildew |  |  |  |  |
| Oxamyl | 10.0 | Nematodes |  |  |  |  |
| Thiophanate-methyl | 1.00 | Powdery mildew |  |  |  |  |
| 17 December 2016 (9) | Metalaxyl+Mancozeb | 2.50 | Downy mildew |  |  |  |  |
| Oxamyl | 10.0 | Nematodes |  |  |  |  |
| Thiophanate-methyl | 1.00 | Powdery mildew |  |  |  |  |
| 27 December 2016 (10) | Chlorothalonil | 38.0 | Downy mildew |  |  |  |  |
| Esfenvalerate | 0.200 | Whiteflies/Thrips |  |  |  |  |
| Myclobutanil | 0.120 | Powdery mildew |  |  |  |  |
| 03 January 2017 (10) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| Acetamiprid | 0.500 | Whiteflies |  |  |  |  |
| Chlorfenapyr | 0.500 | Two-spotted spider mites/Thrips/Whiteflies |  |  |  |  |
| 10 January 2017 (11) | Azoxystrobin | 0.800 | Downy mildew/Powdery mildew |  |  |  |  |
| Iprodione | 1.25 | Botrytis |  |  |  |  |
| Propamocarb-HCL | 3.00 | Downy mildew |  |  |  |  |
| 21 January 2017 (13) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| Acetamiprid | 0.500 | Whiteflies |  |  |  |  |
| Azoxystrobin | 0.800 | Downy mildew/ Powdery mildew |  |  |  |  |
| Dimethomorph | 1.00 | Downy mildew |  |  |  |  |
| Iprodione | 1.25 | Botrytis |  |  |  |  |
| 24 January 2017 (13) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| Azoxystrobin | 0.800 | Downy mildew/ Powdery mildew |  |  |  |  |
| Dimethomorph | 1.00 | Downy mildew |  |  |  |  |
| Esfenvalerate | 0.200 | Whiteflies/Thrips |  |  |  |  |
| Pyrimethanyl | 1.50 | Botrytis |  |  |  |  |
| 30 January 2017 (14) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| Acetamiprid | 0.500 | Whiteflies |  |  |  |  |
| Chlorfenapyr | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| 04 February 2017 (15) | Abamectin | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| Chlorfenapyr | 0.500 | Two-spotted spider mites/Whiteflies/Thrips |  |  |  |  |
| Metalaxyl+Mancozeb | 2.50 | Downy mildew |  |  |  |  |
| Penconazole | 0.500 | Powdery mildew |  |  |  |  |
| 07 February 2017 (15) | Pyrimethanyl | 1.50 | Botrytis |  |  |  |  |
| Metalaxyl+Mancozeb | 2.50 | Downy mildew |  |  |  |  |
| Oxamyl | 10.0 | Nematodes |  |  |  |  |
| Thiophanate-methyl | 1.00 | Powdery mildew |  |  |  |  |
| 17 February 2017 (16) | Chlorothalonil | 38.0 | Downy mildew |  |  |  |  |
| Esfenvalerate | 0.200 | Whiteflies/Thrips |  |  |  |  |
| Spirodiclofen | 0.400 | Two-spotted spider mite |  |  |  |  |
| Thiametoxam | 0.500 | Whiteflies |  |  |  |  |
| 03 March 2017 (18) | Chlorothalonil | 38.0 | Downy mildew |  |  |  |  |
| Esfenvalerate | 0.200 | Whiteflies/Thrips |  |  |  |  |
| Myclobutanil | 0.120 | Powdery mildew |  |  |  |  |