Fig. 1. Cumulative aphid days for monoculture and mixture plots. Each bar represents the mean of five replicates for each individual monoculture or mixture ±1 SE. Values are ranked from smallest to largest for each level of genotypic diversity. Genotypic diversity did not affect cumulative aphid days (*P* = 0.41).

Fig. 2. Dry weight yield for monoculture and mixture plots. Each bar represents the mean of five replicates for the for each individual monoculture or mixture ±1 SE. Values are ranked from smallest to largest for each level of genotypic diversity. Genotypic diversity did not affect plot yield as measured by dry weight (*P* = 0.42).

Fig. 3. Total number of predators excluding ants caught with pitfall traps in monoculture and mixture plots. Each bar represents the mean of thirty replicates for each treatment ±1 SE. Counts were summed across sampling dates. Genotypic diversity total predators excluding ants (*P* = 0.48).

Fig. 4. Total number of *Orius* caught with a beat pan in monoculture and mixture plots. Each bar represents the mean of thirty replicates for each treatment ±1 SE. Counts were summed for four samples per plot, taken at the same time. Genotypic diversity did not affect *Orius* numbers (*P* = 0.70).

Fig. 5. Percent reduction of aphid populations for monoculture and mixture pots after exposure to natural enemies in the field. Each bar represents the mean of eighteen replicates for each treatment ±1 SE. Genotypic diversity did not affect the percent reduction in aphid populations (*P* = 0.42).

Fig. 6. Number of cecidomyiid larvae on soybean monoculture and mixture pots. Values represent means for each treatment ±1 SE. Genotypically diverse pots had more cecidomyiid larvae (*P* = 0.046).

Fig. 7. Percentage of time spent by convergent lady beetles on monoculture and mixture pots in a predator choice arena. Treatments were paired within an arena and N=39 for paired comparisons and values are means for each treatment ±1 SE. Of the time spent on the pots, lady beetles spent more time on the mixtures (*P* = 0.047).



Figure. 8. Soybean aphid populations on three soybean growers’ fields in Centre County, PA. Values represent mean counts of aphids/plant on 20 plants/field ±1 SE.

Tab. 1. Potential natural enemies caught in pan traps in commercial soybean fields in Centre County, PA. Values are number of individuals for each color of pan trap (blue/yellow) in each grower’s field (grower 1-3) summed across pan traps and across dates. Specimens are adults unless otherwise noted.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   |   |   | Blue  |   | Yellow |
| Order | Family | Natural enemy | 1 | 2 | 3 |   | 1 | 2 | 3 |
| Coleoptera | Coccinellidae | *Coccinella septempunctata* | 0 | 0 | 0 |   | 0 | 0 | 0 |
| Harmonia axyridis | 0 | 0 | 0 |   | 0 | 1 | 2 |
| *Propylea quattuordecimpunctata* | 0 | 0 | 0 |   | 0 | 0 | 3 |
| Carabidae | *Lebia viridis* | 0 | 0 | 0 |   | 2 | 0 | 0 |
| *Lebia analis* | 0 | 0 | 0 |   | 1 | 0 | 0 |
| Staphylinidae | Staphylinidae | 1 | 7 | 3 |   | 1 | 3 | 5 |
| Hemiptera | Berytidae | Jalysus spp. | 0 | 0 | 0 |   | 0 | 0 | 2 |
| Anthocorideae | Orius insidiosus | 15 | 19 | 13 |   | 17 | 27 | 25 |
|   | *Lygus lineolaris* | 1 | 2 | 0 |   | 6 | 0 | 1 |
| Diptera | Dolichopodidae | Dolichopididae | 1 | 2 | 0 |   | 135 | 14 | 6 |
| Syrphidae | Toxomerus marginatus | 0 | 2 | 2 |   | 1 | 15 | 2 |
| Toxomerus germinatus | 0 | 0 | 0 |   | 3 | 2 | 1 |
| Sphaerophoria sp. | 0 | 0 | 0 |   | 0 | 1 | 0 |
| Cecidomyiidae | Cecidomyiidae | 0 | 1 | 1 |   | 0 | 0 | 1 |
|   | Forficulidae | *Forficula auricularia*  | 0 | 1 | 0 |   | 0 | 0 | 0 |
| Araneae | Lycosidae | Lycosidae | 0 | 0 | 0 |   | 1 | 0 | 0 |
| Salticidae | Salticidae | 1 | 1 | 1 |   | 0 | 4 | 0 |
| Thomisidae | Thomisidae | 0 | 2 | 2 |   | 2 | 0 | 0 |
| Linyphiidae | Linyphiidae | 0 | 4 | 3 |   | 0 | 0 | 1 |
|   | Other small spider | 0 | 0 | 1 |   | 0 | 1 | 2 |
| Opiliones | Phalangiidae | *Phalangium* spp. | 0 | 0 | 1 |   | 0 | 0 | 2 |

Tab. 2. Potential natural enemies caught in pitfall traps in commercial soybean fields in Centre County, PA. Values are number of individuals in each grower’s field (grower 1-3) summed across pitfall traps and across dates. UNID=Unidentified. Specimens are adults unless otherwise noted.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Order | Family | Natural enemy | 1 | 2 | 3 |
| Coleoptera | Carabidae | *Agonum* sp. | 1 | 0 | 0 |
| *Anisodactylus sancaecrucis* | 22 | 0 | 1 |
| *Bembidion quadrimaculatum* | 2 | 0 | 12 |
| *Cicindella* sp. | 0 | 5 | 0 |
| *Chlaenius tricolor* | 0 | 4 | 3 |
| *Chlaenius* (other) | 0 | 2 | 0 |
| *Clivina* sp. | 1 | 0 | 0 |
| *Dicaelus elongatus* | 0 | 1 | 1 |
| *Diplocheila* sp. | 0 | 2 | 0 |
| *Poecilus chalcites* | 3 | 0 | 1 |
| *Poecilus lucublandus* | 20 | 0 | 4 |
| *Pterostichus melanarius* | 0 | 200 | 117 |
| *Pterostichus* (other spp.) | 1 | 0 | 1 |
| *Stenolophus* sp. | 1 | 0 | 0 |
| Carabidae (other adult) | 3 | 0 | 0 |
| Carabidae (larvae) | 3 | 4 | 0 |
| Staphylinidae | Staphylinidae | 65 | 15 | 31 |
| Lampyridae | Lampyridae (larvae) | 0 | 0 | 2 |
|   | Coleoptera (larvae other) | 3 | 1 | 1 |
| Hymenoptera | Formicidae | *Crematogaster* spp. | 1 | 0 | 0 |
| *Formica* spp. | 5 | 0 | 1 |
| *Lasius* spp. | 29 | 1 | 22 |
| *Leptothorax* spp. | 0 | 0 | 1 |
| *Myrmica* spp. | 1 | 0 | 2 |
| *Ponera* spp. | 0 | 1 | 1 |
| *Prenolepis imparis.* | 9 | 14 | 2 |
| *Solenopsis molesta* | 0 | 5 | 4 |
| *Stenamma* sp. | 1 | 16 | 36 |
| *Tetramorium caespitum* | 1 | 74 | 75 |
| Dermaptera | Forficulidae | *Forficula auricularia*  | 0 | 0 | 1 |
| Araneae | Lycosidae | *Allocosa* spp. | 8 | 9 | 0 |
| *Hogna* spp. | 2 | 0 | 0 |
| *Pardosa* spp. | 108 | 106 | 102 |
| *Pirata* spp. | 0 | 2 | 0 |
| *Trochosa* spp. | 24 | 33 | 35 |
| Lycosidae (juvenille, UNID) | 1 | 11 | 0 |
| Linyphiidae | Linyphiidae | 26 | 12 | 19 |
| Oxyopidae | Oxyopidae | 1 | 0 | 0 |
| Philodromidae | Philodromidae | 0 | 1 | 0 |
| Salticidae | Salticidae | 0 | 0 | 1 |
|   | Other spider | 3 | 3 | 8 |
| Opiliones | Phalangaiidae | *Phalangium* spp. | 27 | 14 | 313 |
|   |   | Centipede (Class: Chilopoda) | 15 | 6 | 26 |

 Tab. 3. Potential natural enemies caught in pitfall traps in commercial soybean fields in Centre County, PA. Values are number of individuals captured during the day and night in each grower’s field (grower 1-3) summed across sweep samples and across dates. UNID=Unidentified. Specimens are adults unless otherwise noted.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Order | Family | **Natural enemy** | **Day** |  | **Night** |
| **1** | **2** | **3** |  | **1** | **2** | **3** |
| **Coleoptera** | **Coccinellidae** | *Coccinella septempunctata* | 0 | 0 | 2 |   | 0 | 0 | 0 |
| *Coleomegilla maculata* | 22 | 2 | 0 |   | 14 | 0 | 0 |
| *Cycloneda munda* | 1 | 0 | 1 |   | 0 | 0 | 0 |
| *Harmonia axyridis* | 0 | 3 | 1 |   | 0 | 0 | 1 |
| *Hippodamia parenthesis* | 0 | 0 | 1 |   | 0 | 0 | 0 |
| *Propylea quattuordecimpunctata* (adult) | 8 | 0 | 13 |   | 8 | 1 | 4 |
| *Propylea quattuordecimpunctata* (larvae) | 5 | 0 | 0 |   | 1 | 0 | 0 |
| **Staphylinidae** | Staphylinidae | 1 | 0 | 2 |   | 3 | 2 | 0 |
| **Carabidae** | *Cicindella* sp. | 0 | 0 | 0 |   | 0 | 2 | 0 |
| *Colliuris pennsylvanica* | 0 | 0 | 0 |   | 0 | 1 | 0 |
| *Lebia viridis* | 2 | 0 | 0 |   | 0 | 0 | 0 |
| **Hymenoptera** | **Formicidae** | *Lasius* spp. | 0 | 0 | 3 |   | 5 | 0 | 0 |
| *Prenolepis imparis* | 7 | 4 | 12 |   | 48 | 15 | 26 |
| *Tetramorium caespitum* | 0 | 2 | 0 |   | 1 | 1 | 0 |
| **Hemiptera** | **Nabidae** | *Nabis roseipennis* (adult) | 16 | 2 | 13 |   | 10 | 4 | 6 |
| *Nabis roseipennis* (nymph) | 0 | 0 | 2 |   | 5 | 2 | 3 |
| *Nabis americoferus* (adult) | 0 | 2 | 8 |   | 0 | 0 | 3 |
| *Nabis americoferus* (nymph) | 4 | 0 | 2 |   | 5 | 0 | 0 |
| **Anthocoridae** | *Orius insidiosus* (adult) | 103 | 147 | 157 |   | 47 | 23 | 25 |
| *Orius insidiosus* (nymph) | 2 | 14 | 12 |   | 5 | 1 | 0 |
| **Pentatomidae** | *Podisus* sp. | 0 | 2 | 2 |   | 0 | 0 | 1 |
| **Miridae** | *Lygus lineolaris* (adult) | 20 | 2 | 14 |   | 5 | 4 | 7 |
| *Lygus lineolaris* (nymph) | 10 | 0 | 4 |   | 5 | 2 | 2 |
| **Dolichopodidae** | Dolichopodidae | 3 | 0 | 1 |   | 2 | 0 | 0 |
| **Cecidomyiidae** | Cecidomyiidae | 2 | 1 | 2 |   | 0 | 1 | 2 |
| **Syrphidae** | *Toxomerus marginatus* | 0 | 0 | 1 |   | 1 | 13 | 0 |
| *Toxomerus germinatus* | 1 | 0 | 1 |   | 0 | 0 | 0 |
| *Sphaeorophoria* sp. | 0 | 1 | 0 |   | 0 | 0 | 0 |
| **Chrysopidae** | *Chrysopa* sp. (adult) | 0 | 0 | 1 |   | 0 | 0 | 0 |
| **Hemerobiidae** | *Micromus subanticus* (adult) | 2 | 0 | 0 |   | 3 | 0 | 0 |
| *Micromus posticus* (adult) | 0 | 0 | 0 |   | 1 | 0 | 0 |
| Hemerobiidae (larvae) | 0 | 0 | 0 |   | 1 | 0 | 0 |
| **Dermaptera** | **Forficulidae** | *Forficula auricularia*  | 0 | 1 | 4 |   | 1 | 17 | 49 |
| **Araneae** | **Tetragnathidae** | Tetragnathidae | 3 | 0 | 31 |   | 1 | 0 | 13 |
| **Thomisidae** | Thomisidae | 9 | 4 | 4 |   | 6 | 9 | 4 |
| **Lycosidae** | Pardosa sp. | 7 | 7 | 4 |   | 7 | 24 | 6 |
| Lycosidae (juvenille, UNID) | 0 | 6 | 7 |   | 0 | 1 | 0 |
| **Salticidae** | Salticidae | 3 | 14 | 9 |   | 2 | 3 | 2 |
| **Oxyopidae** | Oxyopidae | 6 | 1 | 0 |   | 0 | 0 | 0 |
| **Linyphiidae** | Linyphiidae | 3 | 11 | 18 |   | 3 | 3 | 4 |
| **Clubionidae** | Clubionidae | 1 | 0 | 0 |   | 4 | 7 | 11 |
| **Philodromidae** | Philodromidae | 0 | 0 | 1 |   | 0 | 0 | 3 |
| **Araneidae** | Araneidae | 1 | 1 | 5 |   | 0 | 1 | 6 |
|  | Other spider  | 6 | 7 | 12 |   | 2 | 4 | 2 |
| **Opiliones** | **Phalangiidae** | *Phalangiium* spp. | 0 | 1 | 19 |   | 3 | 2 | 23 |
| **Sclerosomatidae** | Sclerosomatidae | 1 | 0 | 0 |   | 0 | 0 | 0 |