

Activity 1A: Conservation biocontrol in restorations. Research and outreach educational programs will be performed to conserve beneficial insects by researching different cultural tactics in restorations.



New IPM outreach bulletins on Best IPM Practices for Back yard Landscape, Best IPM Practices for Open Spaces, Guide to IPM, Pollinator Lawn IPM, Butterfly Gardening booklet, Butterfly & Plant ID booklet, Conserving Rusty Patched Bumble Bee, Conservation Guide , poster Think IPM

Research on best habitat for nesting and overwintering beneficial insects called beetle banks were installed at 3 sites in Washington county. At a citizen science field day, 36 banks at 3 sites had a mean of 131 insects in a sample of 10% of each beetle bank compared to control plots with 1 insect.

Research on best habitat for native stem nesting bees called reed huts were installed at 3 sites in Washington county. At a citizen science field day, 36 reed bee huts were inspected at 3 sites which contained 236 occupied reeds or 95% of the huts occupied by nesting bees.

Research on best larval host plants and adult nectar plants for Minnesota butterflies are listed in bulletins.



Activity 1B: Conservation biocontrol in restorations. Wild flowers in restorations will be investigated for pesticide residue levels that may affect beneficial insect conservation.



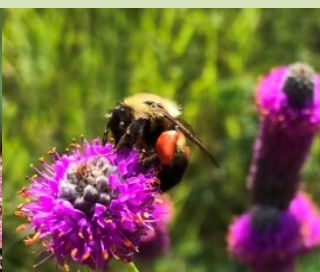
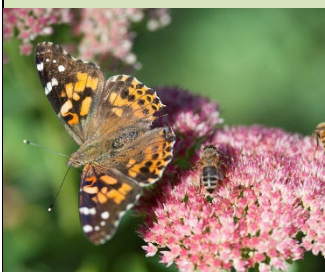
Outreach poster, Think IPM; Outreach talks were 4 workshops/year and 28 talks/year to professionals and consumers. Outreach website at <https://ncipmhort.dl.umn.edu>

Research on LD50 of butterflies and residue of insecticide in the field permit correlation of field doses of insecticides on survival and behavior of butterflies and bumble bees.

Research on pesticide residue on flowers near potato fields showed that 100% of 36 samples tested contained at least 2 and up to 15 different pesticides.

Research on pesticide residue on flowers near corn fields showed that of 40% of 32 samples tested contained only 1 pesticide and it was atrazine.

Activity 2: Beneficial insect friendly pesticides. Research will investigate what pesticides conserve beneficial insects.



Outreach IPM bulletins describe IPM practices based on our research that will conserve bees, butterflies, and other beneficial insects that kill pests.

Research on Acelepryn, a bee-friendly insecticide used for killing Japanese beetles showed that bumble bees are able to tolerate 4 ppm sub-lethal dose. In contrast, Monarch and Painted lady butterfly larvae are killed at 0.030 ppm dose, around 133 times less than bumble bees. bifenthrin

Research showed that Monarch and Painted lady butterflies tolerated higher doses of imidacloprid and clothianidin, and bifenthrin than bumble bees.