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LCCMR, August 2017 - June 2020 Conservation Biocontrol

Summary: We created habitat with beetle bumps for overwintering bees and beneficial insects and hanging straw nests for native stem nesting bees.
2350 overwintering insects in beetle bank samples (compared to 102 in controls)
236 nesting wild bees in bee huts or 95% of huts occupied by nesting bees

Beetle banks for native bees and beneficial insects: Beetle banks were standard practice in farming before the mid-1900. Farmers tilled a row along the edge and in the middle of crops. The tilled row was seeded with bunch grasses. These banks encouraged pollinators, beneficial insects, parasitic wasps, and beetles which fed on pests. We adjusted the original beetle bank design by forming a row of individual "beetle bumps".

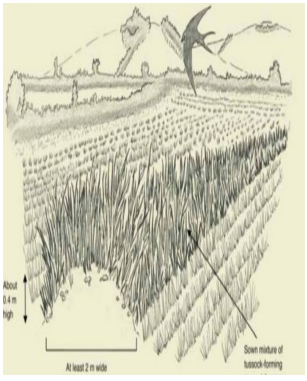
Three beetle bank sites: Three sites were set up May 24 2019. Each site has 6 beetle bumps (piles) and 6 controls. Each beetle bump is numbered and also has a native bee hut. The GPS coordinates for each site are in Table 1. The sites are: St. Croix Bluffs Regional Park East Site, Hastings; St. Croix Bluffs Regional Park West Site, Hastings; 9503 Norell North Site, Stillwater.

Creating beetle banks and hanging native bee stem nests: There is 30 feet between each beetle bump pile. The beetle banks are comprised of 2 cubic yards untreated wood chip mulch, 2 square straw bales, and 2 bee huts hanging on a 5 foot t-post. The 2 straw bales were placed on one side in a V shape to contain the 2 yards of mulch piled high inside the V. The t-post is erected at the tip of the V. The hut is horizontally on the t-post and slanting downward to permit runoff from rain. The beetle bump is identified by 1 orange 6 foot snow flag and 1 small ID flag. The wild bee huts are made of 5" plastic PVC pipe. Inside the hut, reeds are bunched with a rubber band. There are a total of 36 bee huts (18 hanging at the beetle bump, 18 controls on nearby trees). Each bee hut has an ID sticker 1-36

Beetle bank results: On Nov 2 2019 a Citizen Science Field Day was organized to count the number of insects in beetle bumps and control plots. Three groups collaborated on the Field Day: the University of Minnesota Department of Entomology, Pollinator Friendly Alliance, and Washington County Parks. Inspection counts found 2350 overwintering insects in beetle bank samples compared to 102 insects in the controls

Native bee stem nests results: In Nov. 2019, a bee hut inspection found 236 reeds or 95% of the huts occupied by nesting bees. In April 2020, bee huts were placed in cages in the greenhouse. The emerging insects will be counted and identified.

Table 1. Location of beetle bank sites in MN (row 1), making a beetle bump and sieving for insects (row 2), and collecting and identifying insects; the side of a stem nesting bee nest containing empty straws (row 3).



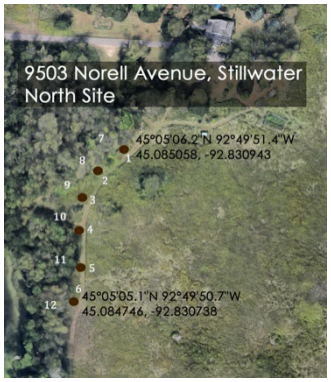








Table 2. The number of insects in beetle banks and control plots (0.5m^2 surface areas).

9503 Norell: Beetle bumps								Controls						
	1	2	3	4	5	6	total	1	2	3	4	5	6	total
sowbug	12	90	44	65	67	14	292				1			1
centipede	2	14	23	19	16	22	96							0
millipede	12	12	6	4	23	8	65							0
psuedoscorpion	26	14	0	0	0	0	40				1			1
red mites	4	6	3	4	4	0	21							0
spiders	4	7	5	2	8	6	32							0
lampyrid	0	3	7	37	7	0	54							0
cantarid							0							0
staphylinid adult	12	23	42	44	57	41	219							0
staphylinid larva	4	0	0	0	0	0	4							0
carabid	4	2	0	0	0	0	6							0
enebrionid larva	28	24	4	5	4	4	69							0
dermestid larva	33	46	33	3	3	0	118							0
weevil	1	3	0	0	0	0	4							0
fly larva	2	8	2	1	2	6	21							0
spiders small	4	6	4	0	4	8	26			2	1	1	1	5
ant	0	0	6	0	0	0	6			1	3	3	7	14
other							0	1						1
total	148	258	179	184	195	109	1073	1	0	3	6	4	8	22

St. Croix West: Beetle bumps								Controls						
	1	2	3	4	5	6	total	1	2	3	4	5	6	total
sowbug	5	24	22	33	0	8	92					2	1	3
centipede	15	13	11	18	9	15	81						2	2
millipede	6	9	4	12	3	3	37							0
psuedoscorpion	0	0	0	0	0	0	0							0
red mite	0	0	0	0	0	0	0							0
spider	5	8	5	7	5	5	35				1			1
cantharid	0	0	0	0	0	0	0							0
lampyrid							0							0
staphylinid adult	18	22	17	39	10	8	114							0
staphylinid larva	21	0	0	0	0	0	21							0
carabid	0	0	0	0	0	0	0							0
tenibrionid larva	0	0	8	0	0	0	8							0
dermestid larva	0	0	0	55	0	0	55							0
weevil	0	0	0	0	0	0	0							0
fly larva	0	8	4	8		0	20							0
spiders small	12	80	22	12	6	16	148	1						1
ant	5	0++	0	0	8	0	13	17	9	36		3		65
other							0							0
total	87	164	93	184	41	55	624	18	9	36	1	5	3	72

St. Croix East: Beetle bumps								Controls						
	1	2	3	4	5	6	total	1	2	3	4	5	6	total
sowbug	24	4	18	16	28	3	93			1			1	2
centipede	37	7	2	14	44	52	156							0
millipede	53	24	44	16	11	30	178						1	1
psuedoscorpion							0							0
red mite				2	8	4	14							0
spider					3		3							0
cantharid		2	7	12	19	12	52							0
lampyrid							0							0
staphylinid adult		6	6		12	58	82							0
staphylinid larva				44			44							0
carabid			1		2		3							0
tenibrionid larva							0							0
dermestid larva							0							0
weevil							0							0
fly larva			3		3		6							0
spider small				11	2		13					1		1
ant							0	1		2				3
other							9							1
total	114	44	88	116	132	159	653	1	1	3	0	1	2	8