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The biological control of leafy spurge-1990

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Leafy spurge in eastern Montana and western North Dakota is a weed of grave public interest. There is strong public support for any type of control effort. Working through Montana's Northeastern Weed Association, 11 eastern Montana counties contributed (coupled with funds from the Montana Weed Trust Fund) to Canada's biological weed control research program. Canada, in turn, has permitted the 11 counties to obtain *Aphthona* species in Canada.

Successful insect introductions have resulted in the requirement for technology to maximize insect numbers through research on release site variables which include: soil type, plant biotype, microclimate, *Aphthona* species, time of release, effects of multiple releases and number of insects released. These data are to be combined with data from Canada and other U.S. research for the development of a larger database for analysis. These data will provide a foundation for the utilization of *Aphthona* species for leafy spurge control and an indication of the needs for additional biocontrol agents for use in areas where the present species are weak. An optimum site is one that will result in a >3% survival rate. The table shows the theoretical increase in insect numbers under varying conditions. Calculations were based upon the bionomics of *Aphthona* species.

(Table found on next page.)

Theoretical increase in insect numbers given different initial release numbers.

Year	50 adults	500 adults	500 adults 8% survival/ generation	1,000 adults	1,500 adults
1990	50	500	500	1,000	1,500
1991	180	1,876	5,000	3,750	5,826
1992	703	7,031	50,000	14,063	21,094
1993	2,637	26,367	500,000	52,734	79,102
1994	9,888	98,877	5,000,000	137,764	296,631
1995	61,798	617,981	50,000,000	1,236,962	1,263,943
1996	646,733	5,497,333	500,000,000	10,314,670	14,222,000
1997	6,083,249	50,832,430	5,000,000,000	121,665,000	182,497,400
1998	83,644,360	836,446,500	50,000,000,000	1,672,283,000	2,503,330,000
1999	1,358,225,000	13,592,250,000	5E+11	27,134,510,000	40,776,760,000
2000	25,435,470,000	3E+11	5E+12	5E+11	3E+11
2001	6E+11	5E+12	5E+13	1E+13	2E+13
2002	1E+13	1E+14	5E+14	3E+14	4E+14
2003	3E+14	3E+16	5E+16	7E+15	1E+16
2004	1E+16	1E+17	5E+17	2E+17	3E+17
2005	3E+17	3E+18	5E+18	6E+18	9E+18

Calculated at 250 eggs/female and 50:50 sex ratio, except for the 8% labeled column; all insects given 3% survival rate for generations 1-3, then it increases to 5%.