Spruce Gall Midge

Mayetiola piceae (Felt)
Diptera: Cecidomyiidae

Brandt, J. P. 2000. A sequential sampling plan for classification of damage caused by spruce gall midge (*Mayetiola piceae* [Felt]). Forest Management Note 65. Edmonton, Alberta, Canada: Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre; 7 p.

Objective: To develop a sequential sampling plan for classifying *M. piceae* damage on white spruce as light, moderate, or severe.

Abstract: The spruce gall midge, *Mayetiola piceae* (Felt), is a periodically severe pest of white spruce, *Picea glauca* (Moench) Voss, in Canada and the northern U.S. Larvae bore into new shoots, causing a noticeable gall in as little as 10 days. Damage by *M. piceae* is seen as reduced growth, deformation, and eventual mortality of twigs. Very little is known about *M. piceae*, except for work published by Felt (1926) and Smith (1952). A sequential sampling plan was devised to classify populations into categories based on the number of galled current-year shoots.

The type I and II errors for sequential sampling were set at 10% such that there was a 1 in 10 chance that the classification was inappropriate. Populations of *M. piceae* were classified as light, moderate and severe if the mean number of galled current-year shoots per branch was ≤3, 4 to 16, and ≥24, respectively. At least 28 uninfested trees must be sampled to classify a site as having light damage, but sites could be classified as having severe damage after sampling fewer trees.

Sampling Procedure: Sample white spruces when galls are visible on current-year shoots. Randomly select stands from the area of concern, as well as trees from the stands of concern and branches from sample trees. Select only dominant or co-dominant trees along a transect with a random start location. From each tree along the transect, remove one branch from each of the lower, middle, and upper crown. Also remove an additional branch from a crown level that is selected at random.

Average the number of galls among the four branches and reference Table I. If the cumulative number of galled current year shoots remains within the continue sampling bands, select the next tree and sample four branches as described above. Add this total to the previous one and reference Table I. Stop sampling if the cumulative total is outside of the continue sampling bands and classify populations appropriately. If the cumulative total remains within the continue sampling band that delineates the light and moderate population levels after sampling 300 trees, classify populations as light-moderate. If the count remains within the continue sampling band that delineates the moderate and severe population levels after counting 2,000 galls, classify populations as moderate-severe.

Note: This plan was not validated with data from other areas of Canada or the USA and should be used with caution until it has been validated for other regions. Although sequential sampling can substantially save time and effort, the plan outlined here quickly becomes labor intensive when *M. piceae* populations fall between the light to moderate ranges.

References:

Felt, E. P. 1926. A new spruce gall midge (Itonidae). Canadian Entomologist 58: 229-230.

Smith, C. C. 1952. The life-history and galls of a spruce gall midge, *Phytophaga piceae* Felt (Diptera: Cecidomyiidae). Canadian Entomologist 84: 272-275.

Table

Table I. Decision values of the *M. piceae* sequential sampling plan. Counts are the accumulation of the average number of galls pooled from a four-branch sample per tree.

Number of trees sampled	< Value = light population		In between values = moderate population			> Value = severe population
5	---		---	---		468
10	---		---	---		568
15	---		---	---		669
20	---		---	---		769
25	---		---	---		870
30	8		202	263		970
35	26		220	337		1071
40	43		237	437		1171
45	61		255	538		1272
50	78		272	638		1372
55	96		290	739		1473
60	113		307	839		1573
65	131		325	940		1674
70	148		342	1040		1774
75	166		360	1141		1875
80	183		377	1241		1975
85	201		395	1342		2076
90	218	Continue Sampling	412	1442	Continue Sampling	2176
95	236		430	1543		2277
100	253		447	1643		2377
105	271		465	1744		2478
110	288		482	1844		2578
115	306		500	1945		2679
120	323		517	2045		2779
125	341		535	2146		2880

130	358		552	2246		2980
135	376		570	2347		3081
140	393		587	2447		3181
145	411		605	2548		3282
150	428		622	2648		3382
155	446		640	2749		3483
160	463		657	2849		3583
165	481		675	2950		3684
170	498		692	3050		3784
175	516		710	3151		3885
180	533		727	3251		3985
185	551		745	3352		4086
190	568		762	3452		4186
195	586		780	3553		4287
200	603		797	3653		4387
205	621		815	3754		4488
210	638		832	3854		4588
215	656		850	3955		4689
220	673		867	4055		4789
225	691		885	4156		4890
230	708		902	4256		4990
235	726		920	4357		5091
240	743		937	4457		5191
245	761		955	4558		5292
250	778		972	4658		5392
255	796		990	4759		5493
260	813		1007	4859		5593
265	831		1025	4960		5694
270	848		1042	5060		5794
275	866		1060	5161		5895
280	883		1077	5261		5995
285	901		1095	5362		6096
290	918		1112	5462		6196
295	936		1130	5563		6297
300	953		1147	5663		6397

Table generated from equations listed in Fig. 2 of the original publication