Natural Resistance to Eastern Tent Caterpillar Among Rosaceous Trees

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Nature of Work: Eastern tent caterpillar (*Malacosoma americana*)(ETC) is one of the most widespread defoliators of deciduous trees in the eastern United States (2). Many species of rosaceous trees, including cherries (*Prunus spp*.) and crabapples (*Malus spp.*), are preferred hosts of ETC (1) . Long-term control of this pest is complicated due to its wide distribution and diverse host range. Webs are highly visible and have been known to induce a primal fear among the generally entomophobic urban population resulting in a low "aesthetic threshold" of tolerance. The objective of this study was to evaluate a diverse collection of rosaceous trees for natural resistance to Eastern Tent Caterpillar.

A collection of 54 taxa of rosaceous trees were evaluated for natural resistance to Easter Tent Caterpillar. No-choice feeding trials were conducted in a laboratory to evaluate growth rates, developmental factors and survival of the of larvae fed leaves from the different taxa as a measure of antibiosis. Larvae were provided with leaves every other day collected from field grown trees every other day. Mean relative growth rate of the larvae was calculated as: (ln final weight - ln initial weight)/time, where ln is the natural log. Foliage samples were collected concurrently with feeding assays, freeze dried, and later analyzed for cyanide, nitrogen, total phenolics, and soluble carbohydrates including sucrose, glucose, fructose, and sorbitol.

Oviposition preference was evaluated as a measure of antixenosis. Pupae and larvae were randomly distributed throughout replicated (n=3) field plantings of flowering cherries and crabapples and egg masses were counted in the fall after leaf drop.

Results and Discussion: Relative growth rates varied considerably from a high of 213 $mg \bullet g^{-1} \bullet week^{-1}$ for insects fed leaves from *Malus* 'Madonna' to a low of 22 $mg \bullet g^{-1} \bullet week^{-1}$ for insects fed leaves from *Pyrus calleryana* 'Bradford' (Table 1). Pupa weights and survival showed similar trends (data not shown). Although none of the plants were completely resistant, many of these taxa demonstrated some antibiosis as indicated by reduced insect growth rates. Larvae fed *Pyrus calleryana* 'Bradford', *M. tschonskii*, *M.* 'Golden Raindrops', and *Prunus sargentii* had growth rates of less than 65% of maximum. Of the endogenous compounds that were analyzed, only total soluble carbohydrates were correlated with growth rate (r=0.68).

Variation in number of egg masses per tree was found to be a function of taxa and tree height. Trees smaller than 2.25 m were less likely to attract egg-laying females. For that reason, only trees _ 2.25 m were included in this analysis (Table 2). Seven taxa of *Malus* and 1 taxon of *Prunus* were found to strongly attract females and had means of 2.9, or more, egg masses per tree. Eighteen other taxa had no egg masses.

Significance to Industry: Of the 54 taxa of trees studied, only 4 (*Pyrus calleryana* 'Bradford', *M. tschonskii*, *M*. 'Golden Raindrops', *and Prunus sargentii*) were adequately resistant to reduce insect growth rates by more than 65%. These taxa might be considered for planting were ETC is prevalent. Seven taxa of *Malus* (M. *hupehensis*, *M*. Sugar Tyme, *M*. `Radiant', *M*. `Doubloons', *M.* `Sinai Fire', *M*. `Sentinel', and *M*. `Snowdrift') were found to strongly attract egg laying females and had means of 2.9, or more, egg masses per tree. These susceptible taxa should be avoided where Eastern Tent Caterpillar is a problem.

Literature Cited

1. Dethier, V.G. 1980. The world of the tent-makers. The University of Massachusetts Press, Boston, MA.

2. Johnson, W.T. and H.H. Lyon. 1976. Insects that feed on trees and shrubs. Cornell University Press. Ithaca, NY.

Table 1. Relative growth rates of Eastern Tent Caterpillar larvae reared on 56 different taxa of rosaceous tree species.

Taxa	mg g^{-1} $week^{-1}$
Malus 'Madonna'	213
Malus 'Baskatong'	207
Malus 'Dolgo'	202
Malus 'Harvest Gold'	201
Malus baccata 'Jackii'	201
Malus 'Snowdrift'	201
Malus 'Indian Summer'	200
Malus 'Radiant'	199
Malus 'Straw. Parfait'	197
Malus 'Red Splendor'	192
Malus 'Sinai Fire'	191
Malus 'Jewelberry'	191
Prunus 'Hilliers Spire'	190
Malus 'Louisa'	190
Malus 'Danald Wyman'	189
Malus 'Adams'	189
Malus 'Silver Drift'	187
Malus 'Doubloons'	186
Malus 'Calloway'	186
Malus 'Brandywine'	185
Malus Sugar Tyme	184
Malus 'Glen Mills'	182
Malus 'Sentinel'	182
Malus hupehensis	178
Malus 'Robinson'	177
Prunus 'Okame'	177
Prunus'Autumn. Rosea'	176
Malus 'Pink Satin'	176
Prunus serotina	174
Prunus 'Canada Red'	174
M. 'White Angel'	173
M. 'Ormiston Roy'	173
P. 'Snow Fountains'	170
M. 'Silver Moon'	168
M. 'Candy Mint'	167
P. 'Hally Jolivette'	166
M. 'Canary'	166
M. zumi 'Calocarpa'	166
M. *floribunda*	165
Malus 'Prairie Maid'	164
Prunus 'Afterglow'	161
Malus 'Molten Lava'	159
Malus 'Mary Potter'	159
Malus 'Pink Princess'	158
Malus 'Adirondack'	156
Prunus 'Kwanzan'	143
Prunus 'Snowgoose'	132
Pruns 'Akebono'	128
Amelanchier 'Aut. Bril.'	114
Malus 'Naragansett'	100
Prunus sargentii	73
Malus 'Golden Raind.'	72
Malus tschonskii	37
Pyrus 'Bradford'	22
$LSD_{0.05}$	52

Table 2. Oviposition preference of Eastern Tent Caterpillar for *Malus* and *Prunus* taxa.

Taxa	Egg masses/tree	Taxa	Egg masses/tree
Malus		*Prunus*	
M. hupehensis	8.3	*P.* 'Afterglow'	2.0
M. Sugar Tyme	7.0	*P.* 'Canada Red'	0.3
M. 'Radiant'	4.3	*P.* 'Autumn. Rosea'	0.0
M. 'Doubloons'	4.0	*P.* 'Hally Jollivete'	0.0
M. 'Sinai Fire'	3.3	*P.* 'Hillier Spire'	0.0
M. 'Sentinel'	3.0	*P.* 'Kwanzan'	0.0
M. 'Snowdrift'	3.0	*P.* 'Mt. Fuji'	0.0
M. 'Harvest Gold'	2.7	*P.* 'Okame'	0.0
M. 'Ormiston Roy'	2.7	*P. sargentii*	0.0
M. 'Donald Wyman'	2.5	*P.* 'Snow Goose'	0.0
M. 'Silver Moon'	2.3	*P.* 'Tai Haku'	0.0
M. baccata 'Jackii'	2.0		
M. 'Red Splendor'	1.7	$LSD_{0.05 =}$	2.9
M. 'Naragansett'	1.5		
M. 'Straw. Parfait'	1.3		
M. 'Radiant'	1.0		
M. *floribunda*	0.7		
M. 'Canary'	0.5		
M. 'White Angel'	0.5		
M. 'Callaway'	0.5		
M. 'Robinson'	0.3		
M. 'Madonna'	0.0		
M. 'Golden Raind.'	0.0		
M. 'Brandywine'	0.0		
M. zumi 'Calocarpa'	0.0		
M. 'Molton Lava'	0.0		
M. 'Adams'	0.0		
M. 'Baskaong'	0.0		
M. 'Indian Summer'	0.0		
M. 'Candy Mint'	0.0		