

NOTE

Evaluation of Flotation as a Method for Determining Infestation of Multiflora Rose Seeds by *Megastigmus aculeatus* var. *nigroflavus* (Hymenoptera: Torymidae)¹

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Radiography is an effective alternative to dissection for detecting multiflora rose (MFR) seeds infested with the rose seed chalcid *Megastigmus aculeatus* var. *nigroflavus* (Nalepa, 1989. J. Entomol. Sci. 24(4): 413-416), but is time consuming and requires specialized equipment. Flotation has been used successfully in detecting seed infestation by wasps of this group; *Pistacia* sp. seeds infested with *Megastigmus pistaciae* float on water, while sound seeds sink (Milliron, 1949. Amer. Midl. Nat. 41(2): 257-420). Flotation was therefore evaluated as a method for determining seed infestation by *M. aculeatus*.

Mature rose hips were collected during January and February of 1989 from a single plant of *Rosa multiflora* located in Raleigh, North Carolina; *M. aculeatus* is overwintering in the fifth instar within the seed at that time (Balduf, 1959. Ill. Biol. Mono. 26: 1-194). Seeds (achenes) were removed from the hips, rinsed free of attached material and mixed into a volume (approx. 2 liters) of tap water. Seeds that rose to the surface of the water were collected. Resuspension and collection were repeated 3 times; at that point all remaining seeds sank. All seeds (floaters and sinkers) were dried on paper towels overnight, glued to 3 × 5" index cards, then radiographed using a Faxitron 43805N. The X-ray film was placed on a light table, inspected using an 8× lens, and the seeds categorized as good (filled), infested, or empty. A total of 2621 seeds were processed.

Overall, 39.1% of the seeds from the sampled host were categorized as empty, 29.3% as infested with *M. aculeatus*, and 31.6% as filled (Table 1). Empty seeds can be reliably removed by flotation; virtually 100% of the unfilled seed were skimmed from the surface of the water. Distinguishing between good and infested seed by this method, however, is less clear cut. Sixty-six percent of seeds infested with *M. aculeatus* remained suspended on the surface of the water, while 77% of good seeds sank. Varying seed characteristics (ex., size of seed, thickness of seed coat) of other plants, varieties or species of *Rosa* may further affect the outcome of the flotation method for determining infested seed. It seems clear, then, that radiography remains the best method for detecting *M. aculeatus* in MFR seed.

These results have implications for the dispersal of both MFR and *M. aculeatus* by water. It is known that branches and hips of *Rosa* sp. can be water dispersed

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Table 1. Number of seeds of *Rosa multiflora* that float or sink, categorized by internal contents.

Seed Status	Number Floating (%)	Number Sinking (%)
Empty	1016 (99.1)	9 (0.9)
Infested	509 (66.3)	259 (33.7)
Filled	194 (23.4)	634 (76.6)

(Ridley, H. N. 1930. The Dispersal of Plants Throughout the World. L. Reeve and Co., Ltd.), however, the seeds are distributed primarily by birds (Rosene, 1950. J. Wildlife Management 14(3): 315-319; Schmid, 1958. Wilson Bull. 70(2): 194-195). This study indicates that there is a possibility of secondary dispersal of MFR seeds if birds feed/roost near a water source; in terrestrial environments, seeds may be carried by running water for as long as they float (Murray D. R. 1986. Seed Dispersal. Academic Press). Furthermore, because most sound MFR seeds sink, while most infested seeds float, water dispersal of the phytophagous wasp *M. aculeatus* is more likely than that of its plant host. I thank Fred Hain for the use of the Faxitron.