MILE-A-MINUTE WEED IN THE NORTHEAST

Larry H. McCormick and C. Fagan Johnson, Jr.
Professors of Forest Resources
Pennsylvania State University
University Park, PA 16802

Mile-a-minute, *Polygonum perfoliatum* L., is an introduced weed from eastern Asia that is rapidly colonizing non-crop areas in Pennsylvania and surrounding states. Since its introduction into the United States, in south-central Pennsylvania, in the 1930s (Moul 1948), the mile-a-minute weed has spread to other regions of Pennsylvania, Delaware, Maryland, New Jersey, New York, Ohio, Virginia, and West Virginia (Mountain 1977).

Identification and Life History

Mile-a-minute is an annual plant easily recognized by its viney stems and light green-blue, triangular leaves (1-2.5 inches across). Other identifying features include numerous sharp, downward curving spines on the stem, petiole, and main leaf veins, a saucer-shaped sheath, which encircles the stem at the nodes, and spherical iridescent blue fruit about 0.25 inches in diameter, borne in terminal clusters from mid-July until frost. Each fruit contains a single spherical, shiny, black achene or seed (0.1-0.15 inches in diameter).

In southern Pennsylvania, seed germination begins in early to mid-March and continues through April. By the middle of June, the stems (often two or three main stems per plant) average six feet or more in length. The stems continue to elongate throughout the growing season, and under favorable growing conditions reach 20 feet or more in length before eventually being killed by fall frost. Flowering begins in early July and continues throughout the remainder of the growing season. Each plant is capable of producing numerous seed (at least 50 to 100 seeds per plant) which are deposited on site or are spread to other sites by possibly water, birds, rodents, or man (Mountain 1989).

Typical habitats for mile-a-minute weed are roadsides, edges of woods and thickets, nurseries, forest clearcuts, utility right-of-ways, and damp areas, such as low meadows and stream banks (Mountain 1989). Mile-a-minute weed establish and grow best in sunny locations with an abundance of plant litter such as leaves, duff, or brush on the soil surface. On recently harvested forest sites, mile-a-minute weed frequently grows on woody debris piles at log landings and on debris windows formed during site preparation. Mile-a-minute weed seems to prefer and grow best on moist sites containing abundant organic matter. While the plant will tolerate light shade, it rarely grows in closed canopy forests. When it does occur within a forest stand, it is usually in areas beneath openings in the canopy.

In south-central Pennsylvania, where many forest sites are heavily infested with mile-a-minute weed, it commonly interferes with forest regeneration. Following overstory removal and site

preparation, dense, almost pure communities of mile-a-minute weed become established and dominate the site by forming a dense canopy covering anything less than 10 feet in height. It has been observed to smother out Japanese honeysuckle (*Lonicera japonica* Thunb.), elderberry (*Sambucus canadensis* L.), and species of Rubus (Moul 1948). In Pennsylvania, mile-a-minute weed is believed to contribute to the mortality of planted loblolly pine (*Pinus taeda* L.) seedlings (Charles Brown, personal communication).

Control of Mile-A-Minute Weed

While it is unlikely mile-a-minute weed can ever be eradicated, control measures are needed to limit its further spread and interference with desired plants. Until recently, little information existed on the control of mile-a-minute weed. Mechanical control, i.e., mowing, hand-pulling, and cultivating, appears feasible for small infestations; however, chemical control is generally needed for large scale control. Preliminary studies by Mountain (1989) indicated that several herbicides were effective in controlling mile-a-minute weed. These herbicides included Attrex 4L (atrazine), Velar L (hexazinone), Roundup (glyphosate), Oust 75W (sulfometuron methyl), and Pursuit (imazethapyr). Similarly, McCormick and Hartwig (1995) showed that a number of herbicides commonly used in forestry were effective in controlling mile-a-minute weed. Pre-emergency treatments of Arsenal (imazapyr), AAtrex Nine-O, Velpar L., and Oust 75W, were very effective in controlling mile-a-minute weed as were post-emergence treatments of Roundup and Arsenal. Studies conducted by Hartwig (1997) and Kuhns and Harpster (1997) found that AAtrex 4L, Goal 1.6E (oxyfluorfen), Oust 75W, Princep 4L (simazine), and Ronstar 50W (oxadiazon), applied as a pre-emergence treatment, provided effective control of mile-a-minute weed, and that post-emergence applications of AATrex 4L, Finale 1S (glufosinate), Garlon 3A (triclopyr), Goal 1.6E, Oust 75W, Ronstar 50W, and Roundup, were effective. Of the herbicides found to be effective in controlling mile-a-minute, only 1.6E has been specifically labeled for mile-a-minute weed control in Pennsylvania. Currently, there are no known effective biological controls for mile-a-minute weed.

Seed Dormancy and Germination

Unlike other weedy species of *Polygonum*, little work has been done on the reproductive biology of mile-a-minute weed. In particular, information on seed dormancy and germination requirements of mile-a-minute weed is needed to predict the likelihood of this weed to spread to other climatic regions of the United States.

Some of the earliest research conducted on seed dormancy and germination requirements was conducted by Wilbur Mountain (Pennsylvania State botanist). Results of his unpublished study showed that mile-a-minute seeds required a period of cold wet stratification to germinate (at least 6 wks), and that maximum germination occurred sooner for scarified seeds (rubbed with sand paper) than for non-scarified seeds.

Johnson (1996) also studied the dormancy and germination requirements of mile-a-minute seed. His study tested seed germination response to scarification, cold-wet and warm-wet stratification treatments over time, and differing germination temperatures. Results of this study showed that mile-a-minute seeds were capable of germinating over a wide range of temperatures from 40-68 F, and that at least nine weeks of cold-wet stratification (2 C) were needed for the germination of

unscarified seeds. Seeds subjected to warm-wet stratification did not germinate. Gerlach Okay (1997) also demonstrated the need for cold stratification for the germination of mile-a-minute seed. These findings have two important implications. First, the ability of seed to germinate under cool temperatures in early spring gives this weed a competitive edge over other annual and perennial plants which do not germinate or initiate growth until later in the growing season. Secondly, the need for an extended period of cold stratification suggests that it is unlikely mile-a-minute weed will become a problem in the warmer regions of the Southeast.

Johnson (1996) also conducted a study on the retained viability of mile-a-minute seed stored under natural conditions. Mile-a-minute seeds were buried at different depths (0-4 inches) in a forest and a field soil followed by retrieval and germination at regular intervals over a period of two years. The results of the study showed that mile-a-minute seeds can remain viable in the soil for at least two years. Seeds removed after 24 months of burial in the forest soil had viabilities of over 95% at all depths. The study also found that only seeds retrieved in the spring germinated. None of the seeds retrieved in the fall following one and two years of burial germinated, yet they remained viable. These findings explain why the removal of mile-a-minute plants from a site before fruiting production occurs, and, assuming no seed migration into the site, often does not prevent the occurrence of new seedlings the following year. These findings also suggest that pre-emergence herbicides are likely to be most effective when applied in early spring.

SUMMARY

Mile-a-minute is a fast-growing annual weed which often invades and dominates plant communities growing in open areas. In Pennsylvania, mile-a-minute weed has hindered the establishment of woody seedlings in recently harvested forest areas. Control of mile-a-minute weed is possible using either mechanical or chemical methods. Mile-a-minute weed continue to spread to new areas in the Northeast and mid-Atlantic regions. Natural resource managers should be on the lookout for this weed in their areas and try to control it to limit its spread.

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