Japanese Knotweed Herbicide Treatment Options (Mid-Michigan Stewardship Initiative and Northern Michigan Invasive Species Network)

Chemical name	Brand name (% active ingredient in this brand)	Rate	Surfactant/ adjuvant needed?	Application method	Timing	Aquatic approved	Notes	Info source
aminopyralid	Milestone (40.6%)	Manufacturer recommends 6-14oz/acre for Japanese knotweed. NMISN* advises 3-7 oz/acre and MMSI** uses 6-10 oz/acre. Must measure sprayer output to calculate dilution of Milestone; see attached protocol for 6oz/acre rate	Yes. 1/2% Cygnet Plus (D-limonene) = 0.6oz/gal spray solution	Foliar spray or "cut stem" application (cut down stems and fill the stem cavity with herbicide solution to avoid drift and overspray; more time-intensive and contains the risk of stem disposal)	Starting when stalks are 3-4' tall; treatment from then through early summer is more effective. When treating in late summer, it is helpful to do a cut of the plants a month or so in advance ONLY IF safe disposal of the stems is possible. At some sites, repeat treatments (spring & summer) may be appropriate, staying under maximum application rate per year	NO	Residual soil activity for 18 months. Tree sensitivity issues for a subset of species; do not spray under redbud, locusts, cedar, juniper, grape, mimosa, mulberry, rose, spruce, caragana, or pinyon pine.	Katie Grzesiak, NMISN; Leslie Kuhn, MMSI
glyphosate	Rodeo, AquaNeat, not RoundUp (53.8%)	Full strength, approx. 4 cc	Yes. 1/2% Cygnet Plus (D-limonene) = 0.6oz/gal spray solution	JK Injector OR cut just below the 2nd node & fill stem. Average stem length 3-5"	During the growing season through fall	YES	Labor intensive, but initial research has shown this method to be highly effective; note that RoundUp and other upland glyphosate formulations include an adjuvant that is toxic to frogs/amphibians. Can use Rodeo and AquaNeat on all sites.	Ardie Roth; Leslie Kuhn, MMSI
imazapyr	Habitat (27.8%)	0.5% (2.3 oz added to 1 gal water)	Yes. 1/2% Cygnet Plus (D-limonene) = 0.6oz/gal spray solution	Light foliar spray; do not spray to the point of solution dripping off leaves	Late August to 1st hard frost	YES	More effective than Milestone and much more effective than Clearcast, with greater off-target risks. Residual soil activity for 2-3 years; mortality of trees within 2 driplines at higher herbicide concentrations (1-2%).	Leslie Kuhn, MMSI
imazamox (see note at right)	Clearcast (12.1%)	NMISN cocktail: 5% Clearcast plus 1-2% aquatic glyphosate (Rodeo, AquaNeat)	Yes. 1/2% Cygnet Plus (D-limonene) = 0.6 oz/gal spray solution for aquatic or upland use. For upland use, can instead use 1-2% canola oil (contains no toxic chemicals) or methylated seed oil (MSO)	Foliar spray or "cut stem" application (cut down stems and fill the stem cavity with herbicide solution to avoid drift and overspray; more time-intensive and contains the risk of stem disposal)	Late summer; Spraying at least 60 days before the first frost is CRUCIAL. This date will vary by location (for northwest lower MI, it's early August).	YES, with aquatic adjuvant	NMISN has found acceptable kill (~5 years), fewer off-target effects than Milestone. MMSI has had poor results with Clearcast applied in mid-August, and it is expensive (~$130/3 gal backpack sprayer full). Additional concern about unknown off-target effects of applying so much herbicide per unit area.	Katie Grzesiak, NMISN; Leslie Kuhn, MMSI

*NMISN = Northern Michigan Invasive Species Network

**MMSI = Mid-Michigan Stewardship Initiative (Mid-Michigan Cluster of the Stewardship Network)

*Note: this information does not constitute endorsement of a specific product or method. All herbicide labels must be followed, and some sites may require permits.