Japanese Honeysuckle *(Lonicera japonica)*: A Literature Review of Management Practices

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INTRODUCTION

Japanese honeysuckle (*Lonicera japonica*) is an exotic trailing or climbing woody vine that is now prevalent throughout eastern, southeastern and midwestern United States. This species was introduced to North America in 1806 (Leatherman 1955) and was highly prized as an ornamental shrub and vine (Andrews 1919). The spread of *L. japonica* outside of cultivation has been attributed to its use for soil erosion control along railroads (Hurt 1926) and highways (Strausbaugh and Core 1978). In addition, large-scale plantings of *L. japonica* have been encouraged in the southeastern United States and the Ozarks for wildlife enhancement (Segelquist et al. 1976). Handley (1945) reported that *L. japonica* is valuable as cover for bobwhite quail (*Colinus virginianus*) and turkey (*Meleagris gallopavo*); that the stems and leaves are food for white-tailed deer (*Odocoileus virginianus*), and the berries are consumed by a large number of song birds. Sheldon and Causey (1974) observed that even-aged pine stands which represent much of the south's "third-growth forest" are low in food resources for wildlife and that plantings of *L. japonica* could increase food resources.

Despite its use to wildlife, *L. japonica* is a tremendous threat to rare native plant species and will modify natural succession. Over 2.5 million acres of Lower Piedmont forest are infested by honeysuckle (Nelson 1953). By weighing down, deforming, and eventually killing saplings (Little and Soames 1967), *L. japonica* is irrevokably altering forest succession (Nelson 1953). Foresters are often reluctant to selectively cut woods that have been invaded by *L. japonica* for fear that they will be unable to re-establish a forest stand afterwards (Little and Soames 1967).

L. japonica also can threaten rare species. In southern 1xnnessee, one of the last sites for *Trillium pusillum* (Trillium), a state endangered plant, is an alluvial forest that was selectively cut five years ago. The logging resulted in a canopy reduction of 30%. This cutting created light gaps in the canopy, allowing honeysuckle to thrive, and the shading effect reduced *Trillium* populations (L. Smith pers. comm.). In this instance, control is complicated by the concern that certain treatments (herbicides, prescribed fire) might adversely affect rare plants.

BIOLOGY

A woody vine, *L. japonica* (Figure 1) has individual runners averaging 2 to 6 meters long (Small 1903, Britton and Brown 1913). Stems are pubescent. Leaves are ovate to oblong, 2 to 5 cm. long, with short petioles (Small 1903; Strausbaugh and Core 1978) and are evergreen (Fernald 1950, Radford et al. 1964) to semi-evergreen (Slezak 1976, Strausbaugh and Core 1978; Barnes and Wagner 1981).

Flowers are opposite, white to pink (often fading to yellow) and 3 to 4 cm. long (Britton and Brown 1913, Fernald 1950). Flowering is from April to June in the Carolinas (Radford et al. 1964), May to June in Missouri (Steyermark 1963) and Michigan (Barnes and Wagner 1981), May to July in West Virginia (Strausbaugh and Core 1978) and Indiana (Deam 1940), and June to August in northern Illinois (Swink and Wilhelm 1979).

The fruits are black, 4 to 6 mm. in diameter, with globose to subglobose berries (Small 1903; Britton and Brown 1913). In the southeastern United States fruits are present from September to November (Fernald 1950).

This species occupies a wide range of habitats, including thickets, fence rows, woodlands, meadows, prairies, sand barrens and roadsides (Fernald

Figure 1. *Lonicera japonica*. A. Habit; B. Flowers; C. Fruits; D. Seeds; Reprinted with permission from: Selected Weeds of the United States, U.S. Department of Agriculture, Government Printing Office, 1970.

1950, Steyermark 1963, Radford et al. 1964; Strausbaugh and Core, 1978). Following its introduction *L. japonica* remained in cultivation until the late 1800's. Neither Gray (1884, 1889) nor Chapman (1897) included *L. japonica* in their respective floras of North America (Andrews 1919). A decade later, *L. japonica* was reported from New York and West Virginia to Florida (Small 1903). By the 1920's, *L. japonica* was reported as widespread over the eastern seaboard from Massachusetts to Texas (Andrews 1919). Andrews (1919) attributed the rapidity of spread to large-scale plantings along railroads. In the Midwest, *L. japonica* was reported for Indiana (Deam 1940) and Michigan (Hanes and Hanes 1947) by the 1940's. The present range includes Massachusetts to Florida, west to Texas, Kansas, and Missouri, and northeast to Indiana, southern Illinois, and Michigan (Steyermark 1963). In northern Illinois, *L. japonica* is relatively infrequent (Swink and Wilhelm 1979).

Leatherman (1955) has proposed that the range of *L. japonica* is controlled by three climatic factors: 1) -1°C mean daily temperature isoline for January; 2) the 100 cm. mean annual precipitatian isoline; and 3) the isoline representing at least 5% of January nights with temperatures of 0° C or less (Figure 2). These conditions are similar to the climate of Nagasaki, Japan, the type locality described by Thunberg in 1784 (Leatherman 1955, Slezak 1976).

By rooting at the nodes of runners *L. japonica* can colonize new areas vegetatively. In dry soils, *L. japonica* may produce branch roots extending laterally two to three meters, and reaching depths of one meter (Slezak 1976). Seeds are transported by water and by birds (Andrews 1919, Hurt 1926). Root sprouts can generate from fragments carried by machinery during cultivation (Hurt 1926). Andrews (1919) observed that flowering is rare outside of cultivation and *L. japonica* most commonly spreads vegetatively.

Honeysuckle is often found in shaded as well as in more open conditions (Hurt 1926, Swink and Wilhelm 1979; Thomas 1980). Although *L. japonica* is tolerant to shade, its rapid growth in woodlands usually follows a natural disturbance such as wind-throws, or disease (Slezak 1976, Thomas 1980), or man's activities, such as timbering or construction (Little and Soames 1967). These disturbances create light gaps in the canopy and provide opportunities for encroachment by *L. japonica*. Slezak (1976) studied the spread of *L. japonica* within a Piedmont forest in New Jersey which had not been logged since the early 1700's. Preliminary surveys in the 1950's revealed the presence of *L. japonica* despite the relatively undisturbed nature of the forest (Slezak 1976). Subsequently, during the past two decades, a series of natural disasters (storm damage and disease) resulted in the formation of numerous canopy gaps and *L. japonica* tripled in abundance and invaded virtually every forest community.

Another interesting finding of Slezak's (1976) study was that as a result of poor canopy cover, the maturity and density of the subcanopy layer was an important control over the abundance of *L. japonica*. This suggests that if *L. japonica* is absent at the site of a newly formed light gap, it may be possible for a dense subcanopy layer to become established and inhibit subsequent growth of *L. japonica*. Little and Soames (1967) noted that seedling growth of *L. japonica* is slow during the first two or three years, until roots are well established. If, however, *L. japonica* is already present at the site of a newly formed light gap, it may proceed to out-grow and overwhelm subcanopy layers (Slezak 1976). As a measure of this growth, Little and Soames (1967) noted that the total length of laterals and sublaterals produced by one sprout in one year was 15 meters.

Although the literature is replete with references to honeysuckle "smothering" or "choking out" native vegetation (e.g. Steyermark 1963, Little and Soames 1967, Barnes and Wagner 1981), this is not exactly what happens. The effect of *L. japonica* on mature canopy trees may be through root competition (Thomas 1980) but it is probably minor. Hurt (1926) believed that there is moisture competition between *L. japonica* and fruit trees in orchards. In this case, *L. japonica* also has a high nuisance value with respect to commercial fruit harvesting.

The honeysuckle can damage shrubs and saplings by weight, and flattens

hedges of commercial barberry orchards in New Zealand (Gunning 1964). Runners also physically deform, bend, and eventually kill saplings (Little and Soames 1976).

MANAGEMENT

Cutting/Mowing. In fields, meadows, and other open areas, *L. japonica* can be controlled by repeated mowing. At the Red Bird Hollow Preserve in Ohio, mowing fields twice each year on about July 15 and September 15 has prevented the spread of honeysuckle. (Hirsch pers. comm.). The extensive root system of mature plants makes eradication by hand-pulling difficult (L. Smith pers. comm.). For *L. japonica* seedlings (less than 2 years old), hand-pulling may be effective (Don Hirsch pers. comm.).

Prescribed Burning. Handley (1945) observed that *L. japonica* only becomes established at sites protected from fire. Once mature roots are established, *L. japonica* recovers strong from single fires (Little 1961, Oosting and Livingstone 1964; Shipman 1962).

A Piedmont pine forest in North Carolina was burned in April 1978, 1979, and 1981 (Barden and Matthews 1980, Barden 1982). The findings demonstrate that fires resulted in increases in coverage and crown volume for forbs and grasses and decreases in coverage and crown volume for honeysuckle and shrubs. The net decline for *L. japonica* from three fires in four years was 49% in coverage and 61% in crown volume (Barden 1982). Despite the successful reduction of *L. japonica*, sprouting continued, and periodic burning will be necessary in the future (Barden and Matthews 1980).

Anderson and Schwegman (1971) observed the effect of two successive burns (March 16, 1969 and April 5, 1970) on *L. japonica*. The frequency of occurrence of *L. japonica* remained the same after the first burn but declined from 24% to 12% following the second burn, which occurred when *L. japonica* buds had just begun to burst.

Cutting and burning used in combination may be an effective management tool. Other woody species, such as *Rhus glabra* (smooth sumac) have been controlled on prairies by burning in early spring to remove top growth and cutting once or twice a year in mid-to-late summer to control resprouting (Martin 1981). In this program, cutting in mid-to-late summer accomplishes two things - it serves to keep subsequent growth low where it is more vulnerable to fire, and it allows grasses and forbs to increase. These not only provide competition and shade out the target species but also provide a good fuel base for subsequent fires (Martin 1981).

Chemical Control. The results of a number of herbicide studies on *L. japonica* and *L.* x *bella* are presented in Table 1. The biology of *L.* x *bella* is similar to *L. japonica* (Fernald 1950, Barnes and Cottam 1974). Glyphosate (Round-up) was very successful when applied to cut root stumps of *L.* x *bella* in fall (Kline 1981, Henderson 1981). Several herbicides were effective when applied as high volume basal sprays in the spring - Velpar (DPX 3674), Bromacil, and DPX 5648-75DF (Romney et al. 1976, Weber 1982).

Biological Control. Grazing by cattle can help control honeysuckle. Nelson (1953) found that a single winter of heavy grazing could reduce honeysuckle. Brender (1967) noted that grazing can help control honeysuckle but not destroy it. Honeysuckle is vulnerable to late fall or winter grazing due to its semi-evergreen nature.

Although quantitative studies have not been done, grazing might be an effective control of *L. japonica* when used in combination with other treatments. In pastures, meadows, and prairies, spring burning could be used to remove top growth, and fall to winter grazing could be used to control resprouting. In woodlands and forests, grazing could be used combined with spring burns or with cutting. Obviously, grazing as a management option has distinct drawbacks, including severe damage to the shrub and herbaceous layer, and should only be considered in the instance of restoring areas that have been severely degraded by *L. japonica* infestations.

SUMMARY

Lonicera japonica represents a major threat to rare species and forest succession throughout eastern, southeastern, and midwestern United States. Although more research is needed, there are a number of management options available to natural area managers for both grassland and forest.

In prairies, meadows, and fields an initial cutting of *L. japonica* can be made, and the cuttings removed. Successive spring burns (Anderson and Schwegman 1971) or mid-summer mowing (D. Hirsch pers. comm.) can be used to reduce *L. japonica*, and a combination of these may be worth trying. Burning would serve to kill top growth, while mowing would control subsequent resprouting and keep *L. japonica* runners low and vulnerable to fire. Increased abundance of grasses and forbs would provide competition and shading of honeysuckle, and provide a good fuel base for subsequent fires. An alternative treatment, for *L. japonica* in thickets, woodlands, along roadsides, or in fence rows, is to cut and treat root stumps with a 1:5 glyphosate to water solution (Kline 1981, Henderson 1981).

Grazing can be used to control *L. japonica*. Late-fall or winter grazing can be used due to the semi-evergreen

Table 1. Results of Chemical Treatment for *L. japonica* and *L.* x *bella.*

Chemical & Application Type	Rate	Loc.	Date	Effectiveness (% Defoliation)	Reference
Glyphosate–cut and treated root stumps	20% V/V (Herb/water)	Wisc.	Sept.	89%	Kline 1981
	50% V/V	Wisc.	Sept.	94%	Kline 1981
	20% V/V	Wisc.	Sept.	"control"	Henderson 1981
Glyphosate–high vol. broadcast	1-2% V/V	NE U.S.	June	80-95	Lynn et al. 1979
Glyphosate	1-2 lb/A	SE U.S.		Sept.	"not adequate" Skroch 1978
	3-4 lb/A	SE U.S.	Sept.	"adequate"	Skroch 1978
Glyphosate 4L–high vol. basal spray	4 lb/A	N.C.	April	"poor"	Weber 1982
Glyphosate 4L+dicamba 4L high vol. basal spray	2+2 lb/A	N.C.	April	"poor"	Weber 1982
Glyphosate 4L+picloram 10K–high vol. basal spray + soil application	2+8 lb/A	N.C.	April	"poor"	Weber 1982
Glyphosate 4L+triclopyr 3L–high vol. basal spray	2+1.5 lb/A	N.C.	April	"poor"	Weber 1982
Dicamba 4L–high vol. basal spray	4 lb/A	N.C.	April	"poor"	Weber 1982
Picloram 10K–soil application	8 lb/A	N.C.	April	"excellent"	Weber 1982
Triclopyr 3L–high vol. basal spray	3 lb/A	N.C.	April	"poor"	Weber 1982
DPX 5648 75DF–high vol. basal spray	0.5 lb/A	N.C.	April	"poor"	Weber 1982
DPX 5648 75DF+hexazione 2L–high vol. basal spray	0.5+0.6 lb/A	N.C.	April	"excellent"	Weber 1982
DPX 5648 75 DF+diuron 80 WP–high vol. basal spray	0.5+8 lb/A	N.C.	April	"excellent"	Weber 1982
Velpar (DPX3674)–high volume basal spray	4 lb/A	Georgia	May	99	Romney et al. 1976
	6 lb/A	Georgia	May	99-110	Romney et al. 1976
	8 lb/A	Georgia	May	99	Romney et al. 1976
Bromacil–high vol.basal spray	6 lb/A	Georgia	May	99-100	Romney et al. 1976

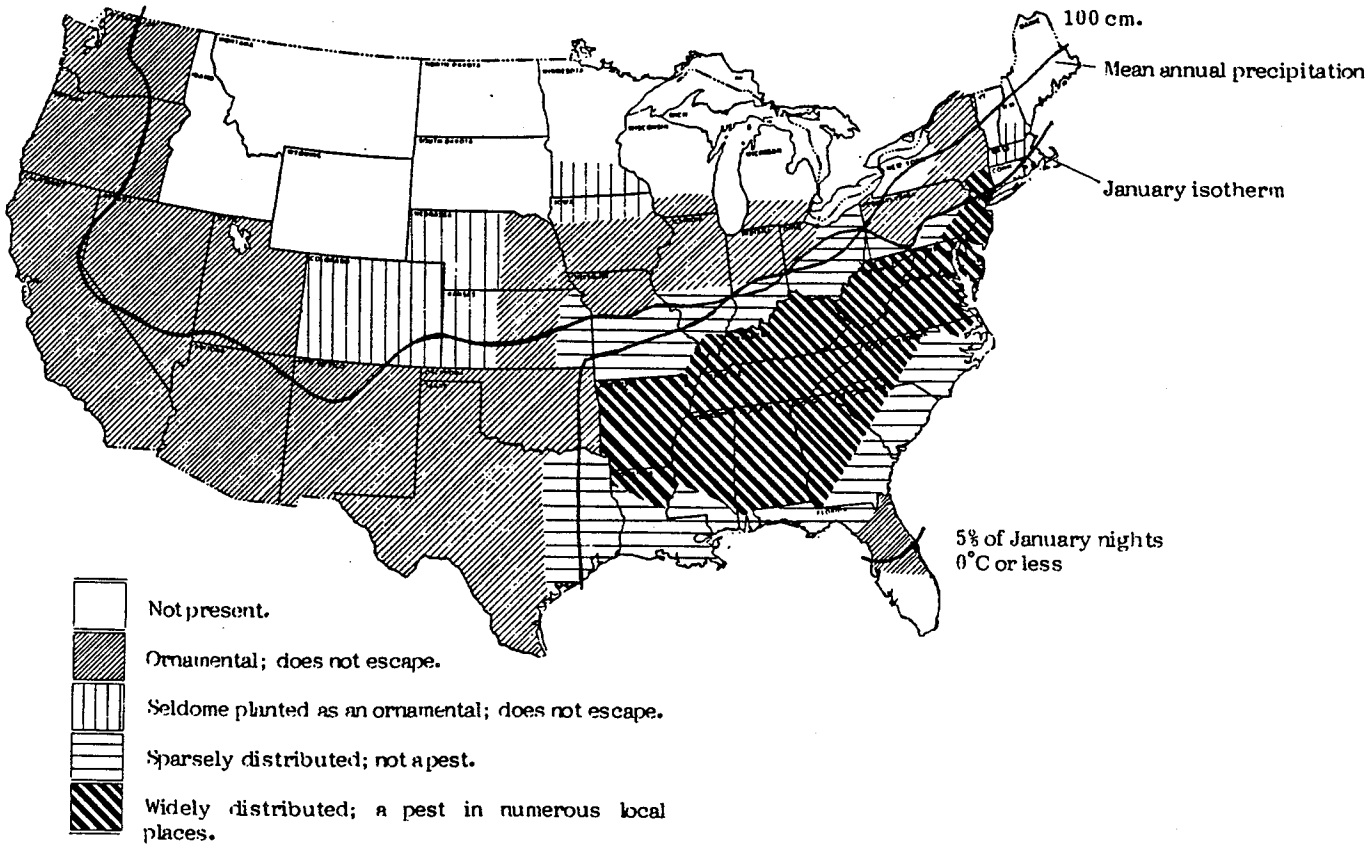

Figure 2. Reports of the known ecological status of *Lonicera japonica* in the United States, and the relation of its distribution to climate. (From Slezak, 1976; data adapted from Leatherman, 1955.)

nature of honeysuckle. It is suggested that grazing be combined with other with other treatments. Burning or cutting should be used to reduce top growth, and make it possible for cattle to reach and consume the subsequent resprouting.

In forests, the most obvious concern is to not disturb closed canopy forests where *L. japonica* is present. Light gaps, formed either by natural processes or human activities, strongly encourages the growth of *L. japonica* (Slezak 1976).

In forests where *L. japonica* is established, successive burn of the ground layer (3 or more years) may reduce *L. japonica* coverage and crown volume (Barden and Matthews 1980, Barden 1982). Oosting and Livingstone (1964) showed that *L. japonica* will spread in forests that are unburned or burned by crown fires, but not in areas burned by ground fires. Handley (1945) observed that *L. japonica* becomes established at sites protected from fire.

Grazing in woodlands that are selectively burned may be a practical way to control resprouting.

Honeysuckle is also grazed by deer (Sheldon and Causey 1974). Again, grazing can cause severe damage to the shrub and herbaceous layers in forests. It may be a desirable option in areas where forests are severely degraded by *L. japonica* infestations. Chemical treatments that have been successfully used include Velpar, bromacil (Romney et al. 1976), picloram 10K soil pellets, and DPX-5648-75DF (Weber 1982).

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