EPPO data sheet on Invasive Plants

Prunus serotina

IDENTITY

Preferred scientific name: *Prunus serotina* Ehrh.
Other scientific names: *Prunus capuli* Cav., *Prunus salicifolia* Kunth, *Padus serotina (Ehrh.) Borkh.*
Taxonomic position: Rosaceae.
Common names: Black cherry, wild cherry (English), capulin, cerisier tardif (French), capulí, cerezo americano (Spanish), Spätblühende Traubenkirsche, Späte Traubenkirsche (German), Amerikaanse vogelkerseboom (Dutch), ciliegio tardivo, pruno tardivo (Italian), czeremcha amerykanska, czeremcha pózna (Polish), cherëmukha pozdnyaya (Russian).
EPPO computer code: PRNSO
Notes on taxonomy and nomenclature
Prunus is a large genus containing many fruit tree species of global economic importance. USDA-NRCS (2004) provides North American distribution maps for the four varieties of *P. serotina*; var. *eximia*, var. *rufula*, var. *serotina* and var. *virens*, though names and numbers of varieties vary between authors. *P. capuli* and *P. salicifolia* have also been described as varieties or subspecies of *P. serotina*, though may also be treated as separate species. In central Europe, the tradition of splitting the genus *Prunus* and placing *P. serotina* and others in the genus *Padus* is becoming obsolete.

MORPHOLOGY

P. serotina is a deciduous, single-stemmed, medium- to large-sized tree. In mixed hardwood forest it can also be a small, contorted, short-lived understorey tree or shrub. Where native, in the eastern USA, *P. serotina* grow to 38 m tall and 1.2 m or more in diameter, whereas in the south-west they are much smaller (Uchytil, 1991). In Central Europe, *P. serotina* is mostly a shrub, rarely a tree up to 20 m in height. Leaves are oblong-ovate to lanceolate-oblong, with toothed edges, bright green above, pale green below. White flowers 8-10 mm in diameter growing in cylindrical racemes 6-15 cm long, each with approximately 30 flowers. Fruits are purple-black drupes of 8-10 mm diameter (Weber, 2003).

SIMILARITIES TO OTHER SPECIES

P. virginiana co-occurs in much of the native range and in some parts of the alien range. It differs in its sharply serrate leaf margin and deciduous calyx (Starfinger, pers. com.)

PLANT TYPE

P. serotina is a seed propagated, woody perennial.

BIOLOGY AND ECOLOGY

P. serotina has a hermaphroditic breeding system, and reproduction is from seed, produced in large numbers from 30-100 years old trees (Cronk and Fuller, 1995), beginning at approximately 7 years old (Starfinger, 1991). Seeds are dispersed by gravity and by animals and require cold stratification to germinate, and germination is higher in litter than in mineral soil. Seeds may remain viable for at least 5 years (Wendel 1972). In forests built of shade tolerant climax trees, *P. serotina* is a gap-phase species (Curtis, 1959), that is shade-intolerant as an adult but capable of germinating and of establishing under a closed forest canopy. These suppressed seedlings can survive extended periods of time without much height growth until they can take advantage of canopy gaps for rapid growth. Natural and anthropogenic disturbance promotes the spread of *P. serotina* (Starfinger et al. 2003). Methods of fruit collection, seed extraction, storage and nursery practice are described by Schopmeyer (1974) and Marquis (1990).

Environmental requirements
P. serotina grows well in temperate and moist climates, and the best growth conditions in its native range occur on the Allegheny Plateau of Pennsylvania and New York, USA (Marquis, 1990). Mean annual temperatures where the species is found are below 24°C, but it will tolerate maximum temperatures above 29°C and absolute minima of -40°C. Best height growth occurs at mean annual rainfall of approximately 1000 mm, with a dry season not exceeding 4 months. In the Midwestern U.S. and in large parts of Europe the species is abundant in regions with less than 700 mm rain annually.

Climatic amplitude (estimates)
- Altitude range: 300 - 1700 m
- Mean annual rainfall: 970 - 1120 mm
- Rainfall regime: uniform
- Dry season duration: 0 - 4 months
- Mean annual temperature: < 24ºC
- Mean maximum temperature of hottest month: 27 - 29ºC
- Mean minimum temperature of coldest month: -11 - -6ºC

P. serotina occurs on a variety of soils except in extremely wet or dry sites, prefers lower east or north-facing slopes rather than dry soils on south or west-facing slopes, and occurs most frequently on very acid and relatively infertile soils (Marquis, 1990). Soil type ranges from sandy loam to silty clay loam. Individuals of *P. serotina* are in natural conditions scattered among other species or even form nearly pure stands at high elevations with impeded drainage (Hough, 1965; Marquis, 1990). On the Allegheny plateau, the species can dominate a successional stage of the beech-birch-maple forest (Illick, 1928) with cover values above 75 %. In the invaded range, *P. serotina* colonizes soils too dry for most woody species, e.g. in dry grasslands, as well as very wet soils as in degenerated bogs (Starfinger, pers. com.)

Climatic and vegetational categorization
P. serotina is associated with areas with a warm to hot wet summer and a cool to cold wet winter. It is hardy to zone 3 (-40 to –34°C). It is associated with the vegetation zones: temperate deciduous forests and mixed conifer forests.

HABITAT
Where introduced, *P. serotina* invades semi-natural or managed woodland particularly on acid sandy soils, establishing both in forest clearings, forest margins and inside forests, often following a disturbance event (Cronk and Fuller, 1995). It also invades open vegetation, e.g., dry grassland or bog degeneration stages (Starfinger, pers. com.).

CROPS / OTHER PLANTS AFFECTED
P. serotina is principally a weed in managed forests. In open vegetation heliophilous and drought tolerant endangered species may be threatened (Starfinger, pers. com.).

PATHWAYS FOR MOVEMENT AND DISPERSAL

Vector transmission

Animals disperse *P. serotina* seeds, with passage through birds increasing germination (Smith, 1975), and mammals including foxes and wild boar also eating the fruit and spreading seeds (Starfinger, 2004).

Movement in trade

P. serotina has been introduced deliberately as an ornamental species. It is used in forestry too.

USES AND BENEFITS

P. serotina is often planted as an ornamental tree in the eastern USA and in Europe, and is also used for land reclamation (Uchytil, 1991). In Europe (e.g., Austria, France, Germany, Poland, The Netherlands), *P. serotina* was often planted under pine and mixed coniferous forests for a variety of purposes (Starfinger et al. 2003): to enrich biodiversity and ameliorate soil conditions, as a wind and fire break as shelter for game, etc. The reddish-brown, strong and hard wood of *P. serotina* is valued in North America where it is used for timber, in construction, for furniture and panelling, veneers, boat parts, handles, crafts, toys, scientific instruments, picture frames, piano parts, etc. (Hough, 1957; Wendel, 1975; Uchytil, 1991). The timber is also imported for the same uses to Europe. Trees with high quality wood in the USA grow predominantly on the Allegheny Plateau of Pennsylvania, New York, and West Virginia (Marquis, 1990). The fruit is used for making jelly and wine and for flavouring rum. The bark of *P. serotina* is used for production of medicines.

GEOGRAPHICAL DISTRIBUTION

EPPO region: Austria, Bosnia and Herzegovina, Belgium, Bulgaria, Belarus, Croatia, Czech Republic, Denmark, France, Germany, Hungary, Lithuania, Luxembourg, Netherlands, Norway, Poland, Serbia and Montenegro (Serbia), Spain, Slovakia, Slovenia, Sweden, Switzerland, United Kingdom, Ukraine.
Asia: Georgia (unconfirmed).
North America: Canada, Mexico, USA (widespread, excepted in the North-West)).
Central America and Caribbean: Guatemala.
South America: Ecuador, Peru.

HISTORY OF INTRODUCTION / SPREAD

P. serotina is native to North America, with var. *serotina* found in central and eastern states of the USA and south-eastern parts of Canada between 49°N and 30°N, and several other varieties are found outside this area (Marquis, 1990). *P. serotina* was among the first North American trees to be cultivated as an ornamental in European gardens, it was reported growing in Paris between 1623 and 1635 (Wein, 1930) and was introduced in England in 1629 (Hough, 1957). Planted in many European countries, it has naturalized and become invasive in many parts. In the Brandenburg area of Germany, the lag time between first introduction and the first report of naturalisation was estimated to be 29 years only, much less than for most other woody species studied (Kowarik, 1995).

IMPACT

Economic impact

P. serotina is known as an aggressive colonizer, overtopping other species of tree. The invasive character of *P. serotina* now naturalized in Europe is an important problem in nature protection and silviculture. Dense thickets of *P. serotina* considerably inhibit seedling development of plantation species making natural and artificial forest regeneration difficult. It is very difficult to remove or reduce the growth of *P. serotina* because of very intensive sprouting and seeding. The leaves, bark and seeds of black cherry are poisonous (Stephens, 1980) and may cause sickness or even death in animals, although many species feed on the fruit (Kingsbury, 1964).

Impact on biodiversity

Dense thickets of *P. serotina* considerably inhibit development of native species reducing plant species richness. This effect is present in forests but more pronounced in open vegetation of heath land and bogs (Stafinger U., pers. com.)

RISK AND IMPACT FACTORS

P. serotina has negative impacts mainly on managed forestry, also affecting natural forests, biodiversity and the environment in general.

SUMMARY OF INVASIVENESS

P. serotina exhibits rapid growth, persistence in shaded sites, a hermaphrodite reproductive system, high seed production and the ability to disperse its seeds through avian and mammalian vectors. It has become invasive in northern and central European where it reduces the biodiversity of native woodland assemblages and impedes forestry production.

	CHARACTERISTIC	**(Y)es, (N)o**
	Invasiveness	
1	Is the species invasive in its native range?	Y
2	Has it proved invasive outside its native range? (i.e. is it an invasive alien species)?	Y
3	Is it highly adaptable to different environments?	Y
4	Does it have high reproductive potential? (e.g. for weeds; prolific seed production, high germination rate, reproduction by rhizomes, tubers, stolons or root/stem fragments).	Y
5	Is it highly mobile locally? (i.e. for weeds, propagules capable of moving long distances by wind, water, attachment to machinery, animals or humans).	Y
6	Can its propagules remain viable for more than one year?	Y
7	Does it tolerate, or benefit from, cultivation, browsing pressure, mutilation, fire etc?	Y
	Impacts	
8	Is it competitive to agricultural and plantation crops or pasture plants?	Y
9	Does it cause impacts on ecosystem processes? (e.g. hydrology, sedimentation, fire risk, nutrient cycling etc.).	N
10	Does it adversely affect natural communities? (biodiversity, native populations, endangered or threatened species) by competition or hybridization (underline one or both).	Y
11	Does it adversely affect community structure? (e.g. effects on the food chain, elimination or creation of a canopy).	Y
12	Does it adversely affect human health? (e.g. allergies, effects on water or air quality).	N
13	Does it have sociological impacts on recreational patterns, aesthetics, property values?	N
14	Is it harmful to animals? (e.g. poisonous plant parts or vector of animal diseases).	Y
15	Does it produce spines, thorns or burrs (or other discomfort)?	N
16	Is it a host or vector to recognised pests and pathogens of agriculture or forestry etc?	N
	Likelihood of entry/control	
17	Is it highly likely to be transported internationally (a) accidentally? (e.g. as a contaminant).	N
18	Is it highly likely to be transported internationally (b) deliberately? (e.g. as an ornamental)	Y
19	Is it difficult to identify / detect as a commodity contaminant? (e.g. due to small seed size)	N
20	Is it difficult to identify / detect in the field? (e.g. similarities to other species,	N

	inconspicuousness)	
21	Is it difficult / costly to control? (e.g. resistance to pesticides)	Y

CONTROL

Cutting of P. serotina results in vigorous resprouting from stumps and roots so that additional treatment is necessary. Hand-pulling is suitable for removing seedlings and juvenile plants, the stumps of larger trees may either be pulled by tractors or horses or treated with herbicides (Weber, 2003). Drogoszewski (1988) proposed chemical treatment combined with mechanical removal, and the basal bark of mature trees may also be sprayed with herbicide (Weber, 2003). The potential of a fungal pathogen for controlling *P. serotina* has been investigated (De Jong & Scheepens 1982). Successful control of P. serotina may be achieved but is very expensive.

REGULATORY STATUS

Its use in forestry is forbidden in Niedersachsen, Germany. Köhler (2003) lists it among rare but spreading 'grey list neophytes' in Switzerland and it also appears on a list of invasive species for Belgium. Both these listings are of no regulatory consequence.

REFERENCES

Cronk QCB, Fuller JL (1995) Plant invaders: the threat to natural ecosystems. London, UK; Chapman and Hall Ltd. 241 pp.

Curtis JT (1959) The vegetation of Wisconsin. Madison, USA: University of Wisconsin Press.

De Jong, M.D., & P.C. Scheepens (1982). Control of *Prunus serotina* by *Chondrostereum purpureum*. Acta Botanica Neerlandica **31**: 247

Drogoszewski B (1988) Use of herbicides of the 2,4,5-T group for control of *Padus serotina*. Pt. III. Choice of the optimum doses of Tormona 80 and Lignopur forte for control of bushes. Prace z Zakresu Nauk Lesnych, **66**:9-16.

Hough RB (1957) Encyclopedia of American Woods. New York, USA: R. Speller and Sons.

Hough AF (1965) Black cherry (*Prunus serotina* Ehrh.). In: Fowells AH, comp. Silvics of forest trees of the United States. Agriculture Handbook **271**. Washington, DC, USA: USDA, 539-545.

Illick, J. S., and L. Frantz. (1928) The beech-birch-maple forest type in Pennsylvania. Penn.Dept. For. Waters Bull. **46**: 1-40

Kingsbury JM (1964) Poisonous plants of the United States and Canada. Englewood Cliffs, NJ, USA: Prentice-Hall.

Köhler B (2003) Black list, grey list and watch list. CPS/SKEW. http://www.cps-skew.ch/english/black_list.htm.

Kowarik I (1995) Time lags in biological invasions with regard to the success and failure of alien species. In: Pysek P, Prach K, Rejmane M, Wade M, eds. Plant invasions: general aspects and special problems. Workshop held at Kostelec nad Cernymi lesy, Czech Republic, 16-19 September 1993. Amsterdam, Netherlands; SPB Academic Publishing, 15-38.

Marquis DA (1990) *Prunus serotina* Ehrh. Black Charry. In: Burns RM, Honkala BH, eds. Silvics of North America. Agriculture Handbook **654**, Volume 2. Hardwoods. Washington, DC, USA: USDA, 238-249. http://willow.ncfes.umn.edu/silvics_manual/volume_2/.

Schopmeyer CS (1974) Seeds of woody plants in the United States. USDA Agriculture Handbook, **450**. Washington DC, USA: USDA.

Smith AJ (1975) Invasion and ecesis of bird-disseminated woody plants in a temperate forest sere. Ecology, **56**(1):19-34.

Starfinger, U. (1991) Population Biology of an Invading Tree Species - *Prunus serotina. In:* Seitz, A., and Loeschke, V., eds., Species Conservation: A Population Biology Approach: Basel, A. Birkhäuser Verlag, p. 171-184.

Starfinger, U., Kowarik, I., Rode, M., Schepker, H. (2003) From Desirable Ornamental Plant to Pest to Accepted Addition to the Flora? – the Perception of an Alien Tree Species Through the Centuries. —Biological Invasions **5** (4): 323-335

Starfinger U (2004) Institut für Ökkologie der TU Berlin. Prunus serotina Ehrh. (Rosaceae), Späte Traubenkirsche. http://ice.zadi.de/floraweb/neoflora/handbuch/Prunusserotina.html.

Stephens HA, (1980) Poisonous Plants of the Central United States. Lawrence, KS, USA: The Regents Press of Kansas.

Uchytil RJ (1991) *Prunus serotina*. In: Fischer WC, ed. The Fire Effects Information System . Missoula, USA: USDA-Forest Service, Intermountain Research Station. http://www.fs.fed.us/database/fei.nts/tree/pruser/introductory.htm.

USDA-NRCS (2004) The PLANTS Database, Version 3.5. Baton Rouge, USA: National Plant Data Center. http://plants.usda.gov.

Weber E, 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. Wallingford, UK: CABI Publishing.

Wein, K. (1930):Die erste Einführung nordamerikanischer Gehölze in Europa. I..

Wendel, G. W. (1972) Longevity of black cherry seed in the forest floor. USDA Forest Service, Research Note NE-**149**. Northeastern Forest Experiment Station, Upper Darby, PA. 4 p.

Wendel GW (1975) Stump sprout growth and quality of several Appalachian hardwood species after clearcutting. USDA Forest Service Research Paper No. NE-**329**. USDA-FS: Northeastern Forest Experiment Station. 9 pp.