Swiss stone pine

Pinus cembra L.* | *F: Arolle* | *I: Cirmolo, pino cembro*| *R: Schember* | *E: Swiss stone pine

General

Swiss stone pine is a characteristic tree species of the subalpine zone of the Alps and, together with larch, forms the highest closed forests at the treeline in many places. In Switzerland it occurs mainly in continental inner-Alpine regions. It is adapted to the harsh high-mountain climate and often grows between about 1500 and 2500 m a.s.l. A special feature of Swiss stone pine is its close relationship with the spotted nutcracker (*Nucifraga caryocatactes*). The large, wingless seeds are not dispersed by the wind but mainly by the nutcracker, which removes them from the cones and hides them in the ground as food stores.

Flowering

Swiss stone pine is monoecious, bearing male and female inflorescences on the same tree. The pollen is dispersed by the wind. The female inflorescences are found mainly in the upper, well-lit part of the crown. Seed and cone development extends over two growing seasons. The large cones clearly visible in summer, whose seeds ripen in the same year, therefore originate from the previous year's flowering.

Fruits

Swiss stone pine cones are sturdy and remain closed even when the seeds are ripe. The ripening cones are green to tinged with purple and are found mainly in the upper crown. They contain large, heavy, wingless seeds. In late summer, nutcrackers begin harvesting the ripening seeds.

Masting behaviour

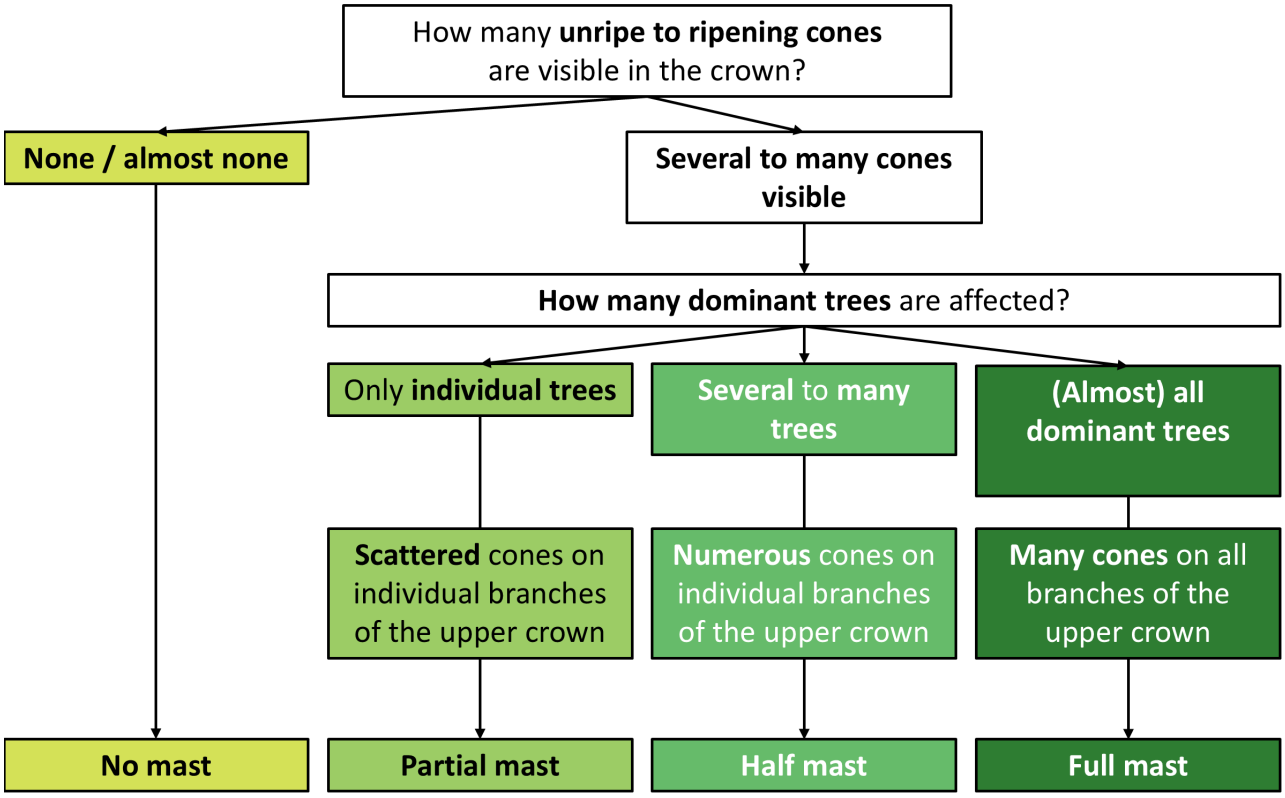
In Swiss stone pine, too, seed production varies considerably between years. In mast years, numerous cones can appear simultaneously on a large proportion of the reproductively mature trees in a stand. In addition to flower formation, pollination and cone development are decisive for successful seed production.

Mast assessment

Timing: mid-July to mid-September at the latest; preferably mid-July to the end of August.

The assessment covers the large, still-closed, unripe to ripening cones of the current seed crop in the crown. Owing to their size and green, sometimes purplish colour, they are relatively easy to see with binoculars at this time. The survey should ideally be carried out before nutcrackers have harvested a large proportion of the cones. This activity increases from August onwards; by September the visible cone crop may already be considerably reduced. Late observations can therefore lead to an underestimate of actual seed production. As the cones are located mainly in the upper crown, good light and visibility conditions and good binoculars are important for a reliable assessment.

Assessing the fruit load: Seed masting is a stand-level phenomenon. Wherever possible, several dominant, reproductively mature trees in a stand are assessed. The mast class describes the stand as a whole, not individual trees with particularly heavy or light fruiting. If the fruit load is uneven, choose the class that best characterises the stand as a whole. The intensity of Swiss stone pine mast can be estimated using the following key:


How many **unripe to ripening cones** are visible in the crown?
None / almost none
Several to many cones visible
How many dominant trees are affected?
Only **individual trees**
Several to **many trees**
(Almost) all dominant trees
Scattered cones on individual branches of the upper crown
Numerous cones on individual branches of the upper crown
Many cones on all branches of the upper crown
No mast
Partial mast
Half mast
Full mast