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ORNAMENTAL CLIMBER *Tecoma radicans* A. L. Juss. PROBLEMS AND CONTROL

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An important ornamental climber in the conditions of small spaces and low intensity of maintenance becomes a weed in urban gardens. On Belgrade territory, several locations were found where the species *Tecoma radicans* A. L. Juss. developed to the degree that it violated some elements of town gardens or structures and even roads. When a plant species loses its main role, in this case ornamental, and when it is transformed into a weed, it is necessary to suppress it, in the specific cases by removal.

Key words: Tecoma radicans, landscape architecture, horticulture, weeds in garden, wood anatomy, control

INTRODUCTION

Gardens are very significant parts of green spaces in towns and settlements in general. In some places, gardens are the only existing forms of green spaces.

Vertical landscaping is usually applied in gardens; it is much less frequent in the streets, parks or other forms of green spaces. Vertical landscaping includes the greening of pergolas, walls, terraces, balconies, roofs. This form of greenery is very much specific, the conditions and the development of plants

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applied in vertical landscaping are often very unfavourable and difficult. Vertical landscaping is most often implemented at places which do not enable the establishment of classical green spaces, i.e. in the areas which are small, narrow or otherwise not suitable for the establishment of a sufficient amount of greenery. Plant species applied in vertical landscaping are most often climbers. The reasons for using climbers in vertical landscaping are numerous: they are fast growing, well branching, with intensive shoot vigour, it is possible to direct their growth, they climb by adhesive habit by themselves or helped by some elements, they grip vertical structures or vertical elements, and they tolerate pruning. The climbers which, along with the above characteristics, also have beautiful flowers, fruits, long flowering periods, ornamental foliage during the vegetation growth period or in the autumn, are considered suitable for vertical landscaping.

Tecoma radicans A. L. Juss. (Fam. *Bignoniaceae*; Syn. *Capsis radicans*) is a very popular ornamental climber in the gardens of Serbia, it is implemented in landscaping vertical structures, pergolas, columns, walls, hedges. Most often, it is planted by itself or in combination with other species of climbers, such as wisteria (*Wisteria sinensis* Nutt.), or in landscaping fences, with species like ivy (*Hedera helix* L.), honeysuckle (*Lonicera caprifolium* L.), etc.

Natural habitats of this species are wet forests, more or less swampy sites in the east parts of North America. It is grown as an ornamental species throughout the world (VUKIČEVIĆ, 1987).

The most frequent use of Tecoma is the clothing of pergolas, walls, and terraces. This species can reach the height (length) of up to 15 m (VUKIČEVIĆ, 1987); it grips the support with its aerial roots. The decorative character of this species is reflected in its monumental growth, compound imparipinnate leaves and primarily in its flowers which are most often red or orange in colour. Abundant flowering and a long flowering period, from July to September, are additional reasons why this climber is one of the most widely used species for vertical landscaping of gardens, but also in urban green spaces in general.

In urban conditions, the species *Tecoma radicans* thrives very well. In the nurseries, it is most often propagated by seed, layering, grafting and by cuttings.

A very ornamental climber, *Tecoma radicans* in unfavourable conditions of growth and development, small space, under low maintenance intensity, can lose or diminish its major amenity function - making the human environment more beautiful and enhanced.

MATERIAL AND METHOD

In the territory of Belgrade, we recorded several locations where the species *Tecoma radicans* developed to such an extent that it violated some elements of town gardens or structures and even roads. The behaviour of this plant species in green spaces has been monitored and analysed for several years. At certain sites, this species retained its ornamental features, but it disturbed the wall which it clothed, e.g. Elementary School „Josip Pančić“, Banovo Brdo. In a private garden at Vračar,

Mlade Bosne Street, Tecoma invaded the pergola, loaded and overtopped the wooden fence. By its root suckers it spread to other parts of the garden, neighbouring yards and the road. In the surroundings of Pančevo, this species overtopped the pergola and damaged the roof of the building that was to be decorated.

Based on the analysis of vertical landscaping in Belgrade, we concluded that this otherwise ornamental climber in the conditions when it loses its major amenity role, in this case ornamental, becomes a weed and then it should be eliminated.

The suppression of Tecoma in gardens may be a problem, because this species has extraordinary shoot vigour. It spreads throughout the garden area where it is most often combined with other plant species, which should not be eliminated. The suppression of this plant species was performed by mechanical methods and by applying the herbicide sulfosate (preparation Touch-down 4-LC) by foliar treatment and spreading the preparation over the surface area of the stump section.

In the aim of a more detailed study of the species *Tecoma radicans* and in order to justify the suppression methods, anatomic sections of the plant stem were cut up. The felled Tecoma trees were cut into 20-mm thick disks, from which specimens were selected, suitable for cutting cross, radial and tangential sections by a sliding microtome. The thickness of cross sections was 17 mm. Franklin's reagent for maceration (30% H_2O_2 and 96%CH_3COOH, scale 1:1) was dosed on the cut up pieces of Tecoma wood of match size in glass tubes stopped up with corks and left in a thermostat during 24^h. By dissolving the intercellular substance, individual cells were obtained, suitable for anatomic analysis. In this way, it was possible to make detailed analysis of the forms and sizes of cells represented in Tecoma wood.

RESULTS AND DISCUSSION

The climber *Tecoma radicans* grows and develops very successfully in the region of Serbia. It is very ornamental, it grows and develops successfully at all sites where its growth and development was monitored. It does not have any special requirements regarding soil quality. It thrives in the conditions of the temperate continental climate, and it tolerates the contaminated urban environments. At some localities, this species was characterised as being very aggressive, invasive and competitive compared to other plant species of green spaces.

By irregular and inaccurate maintenance, this plant species as well as the majority of other ornamental plants, loses or diminishes its ornamental features. At the localities where branch pruning and cutting down shoots and suckers was a regular practice, Tecoma growth was controlled and guided correctly, in the desired directions. By regular and correct pruning, we stimulate flowering and simultaneously reduce the weight which endangers the supports (wooden, metal pergolas, columns, walls, cables, etc.) that hold up the aboveground organs of this plant species. Frequently, however, this measure of maintenance by pruning is being neglected, although this form of damage caused by climbers in green spaces is the most harmless and most easily solved problem, simply by pruning.

In the yard of the Elementary School „Josip Pančić“, *Tecoma radicans* damaged a large area of the school facade. In 1995 the tree was felled and removed from the building façade. The remaining stump was not treated. In the following five years, the plant developed again with many stump shoots and suckers near the stump, throughout the lawn.

Nine Tecoma trees were monitored at Vračar. Nine-year old Tecomas hanged on the fence and invaded plant species situated in its vicinity. The crown of birch (*Betula pendula*) was deformed, the lowest branches of Atlas cedar (*Cedrus atlantica*) were irregularly arranged, lawn area of 30 m^2 was occupied intensively by tecoma root suckers. Root suckers appeared in flowerbeds disturbed their composition and endangered the survival of the garden. Root suckers were observed also in the neighbouring yards. The invasion of these suckers was very intensive in 1999-2000, both in neighbouring yards and on the pavement and road, in the street Mlade Bosne.

This very ornamental climber in the above localities violated the appearance of green spaces, endangered the structures, roads, and other plant species. Regular pruning could have prevented the development of the climber in unwanted directions, whereas the problem of root suckers is not simple to resolve.

At the locality Vračar, which we were permitted to examine (private property) we undertook the tecoma control or the suppression measures. In the period 1997-1998 growth control, i.e. suppression of root suckers was performed mechanically, by weeding, rooting out suckers from flowerbeds and the lawn. In a very short period root suckers regenerated even in a considerably greater number than prior to weeding. During 1999, we removed root cuttings together with root parts from the lawn where the suckers appeared, after which the lawn was regenerated by sawing. The aim of lawn maintenance was to enhance its visual and functional characteristics (STAVRETOVIĆ, 1999), but also to achieve the full coverage of the lawn, which makes the growth of other plant species difficult. This method of mechanical control of tecoma root sucker growth was not successful, and in the following spring, it reinvaded the entire lawn area.

As mechanical removal of root suckers was not successful, by the end of September 2000, we undertook tecoma suppression by the herbicide sulfosate. Foliar treatment with a 2% solution of the preparation Touch-down 4-LC was only partially efficient. A greater part of foliar mass was killed, while the survived part remained green. The good results were achieved by treating the stumps with a 20% solution of the above preparation. The stumps were treated immediately after tree cutting and already in several days, root suckers were destroyed. For practical application, we recommend stump treatment, because we achieved satisfactory results, the solution is very simply applied and practically it is not possible to endanger the adjacent plants by spreading the herbicide.

Aiming at a detailed study of this climber, we analysed its anatomic structure in order to clarify the reasons of the very efficient destruction of tecoma and its root suckers (which were often up to 3-7 metres distant from the tree) by treating the stump surface area with chemicals (in this case, sulfosate).

Figure 1. - Tecoma radicans in hedge

Figure 2. - Stem of tecoma

Figure 3. - Effects of foliar treatment

Figure 4. - Mortified tecoma in flower bed

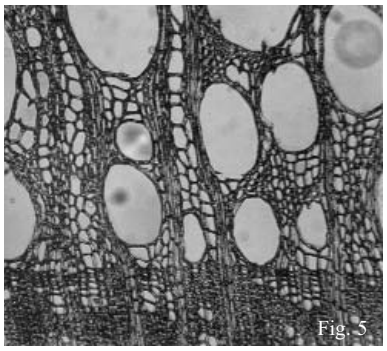
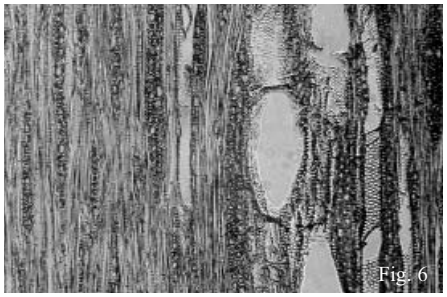
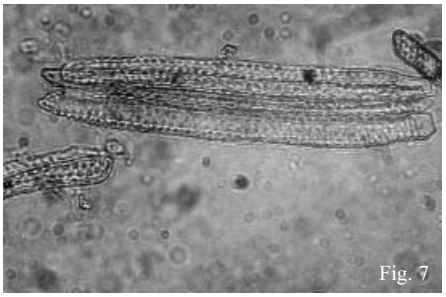


Figure 5. - Cross section of tecoma tree
Figure 6. - Tangential section of tecoma tree
Figure 7. - Single vessel elements of tecoma tree





In the analysis of the macerated material, the following anatomic elements were separated: the tracheary elements were composed of broader and shorter parts of the early zone vessels with notably wide tails, and considerably narrower parts of the late zone vessels with densely arranged wall pitting and spiral thickenings in the form of ridges protruding in the lumen of the vessels, which increases the vessel rigidity and facilitates water conduction. The mechanical elements represented in tecoma have a typical structure of wood fibres, radial parenchyma consists of multiseriate homocellular rays, and the wood of this species also contains the cells of axial parenchyma. The observed anatomic

elements point to the anatomic structure of broadleaves. Based on maceration method it can be concluded that *Tecoma radicans* belongs to broadleaf species. The cross section of the analysed species shows the ring porous structure of broadleaves, with coarse vessels of the early zone and narrower vessels of the late zone arranged in tangential series.

CONCLUSION

In unfavourable conditions, overgrown plants of *Tecoma radicans* become a threat to other elements within the urban space. In that case, we treat them as weeds and undertake their removal in order to create the optimal conditions of quality green spaces, and also other elements of urban environments.

The destruction of tecoma root suckers by mechanical means did not produce the desired results.

Foliar treatment with 2% solution of the preparation Touch-down 4-LC was partially efficient.

The treatment of stump section area with 20% solution of the above preparation produced good results. The cut plants and root suckers which were up to seven metres distant were successfully eliminated, without destroying any adjacent plants from flower gardens or lawns.

The destruction of root cuttings distant from the point of herbicide application (stump) is enabled by specific vascular elements, the vessels formed in spring, with notably wide lumens and marked spiral thickenings in internal walls. As the role of spiral thickenings of vessels is to speed up the transport of water, their presence makes this species suitable for treatment with chemical herbicides aiming at weed suppression.

Adequate, regular and timely maintenance of green spaces and the knowledge of plant properties applied in the establishment of green spaces enables a long-term function of the greenery.

Employment of skilled professionals in planning, establishment and maintenance of green spaces can lessen or annul the multiple problems caused by amateur unprofessional work.

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DEKORATIVNA PUZAVICA *Tecoma radicans* A. L. Juss. PROBLEMI I SUZBIJANJE

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Rezulati su pokazali da uništavanje izdanaka tekome iz korena mehaničkim sredstvima ne daje rezultate. Folijarno tretiranje 2%-nim rastvorom preparata Touch-down 4-LC je delimično efikasno. Pravilna, redovna i pravovremena nega zelenih površina omogućava dugoročnu funkcionalnost zelenila. Angažovanje kvalifikovanih lica pri planiranju, podizanju i održavanju zelenila može umanjiti ili anulirati mnoge probleme koje nestručni rad prouzrokuje.

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