

Thesis summary

**THE ECOLOGY, TOXICITY AND CONTROL
OF *CORIARIA* (TUTU) SPECIES IN THE SOUTH
ISLAND OF NEW ZEALAND**

(Ph.D. thesis, University of Otago)

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Investigations into particular aspects of the biology, toxicity and eradication of three different growth forms (arborescent, suffrutescent and herbaceous) of *Coriaria* found in the South Island, New Zealand, are reported. Previous relevant studies are reviewed and some recommendations for future research given.

The distributions of the different forms were mapped and found to vary with altitude and distance from the sea-coast. *C. arborea* prefers wet lowlands, the herbaceous *C. plumosa* sub-alpine habitats, and *C. sarmentosa* intermediate situations. *C. sarmentosa* is the most abundant species in agricultural and pastoral lands below 1200 m but all species have been associated with livestock poisonings, resulting in deaths occasionally.

Phenological differences among the species were recorded and species productivity above ground measured over two years at inland and near-coastal stations using different methods for different methods for different growth forms. Replacement stem elongation in *C. arborea* was rapid in spring but did not increase significantly after mid-summer. Large differences in cumulative yields of leaves, stems and total standing crops were recorded among plots of *C. sarmentosa* growing at different sites and elevations, with mean monthly standing crop yields ranging from c. 300 to c. 9000 kg/ha. Maximum cumulative yields of *C. plumosa* attained c. 3000 kg/ha/yr on ungrazed sites at 350 m and 770 m. Possible explanations (based on climatological records and soil moisture status) for the wide variations in *Coriaria* productivity are discussed.

Leaves of *C. arborea* and leaves, stems and rhizomes of *C. sarmentosa* were analysed for the presence of the convulsive poison, tutin. All samples tested contained the toxin in varying concentrations which were estimated by gas-liquid chromatography. Tutin concentrations in *C. arborea* leaves ranged from 0.90% in spring to 0.015 % in winter, but inland and near-coastal mean values did not differ significantly. Growing-season means-over two years for *C. sarmentosa* leaves ranged from 0.06

and 0.09% near the coast to 0.06 and 0.03% at inland and upland sites, respectively. No consistent pattern of variation with dates was found.

Various herbicides applied in different formulations reduced foliar *tutin* contents of *C. arborea* and *C. sarmentosa* to as little as 10% of control values (depending upon application rates) within one to two months after treatments, but none eliminated the toxin completely within those periods.

Optimum herbicide treatments for plant destruction differed with growth forms. For *C. arborea* (plants to 12 m² canopy area) 4.5 g butoxy-ethanol ester 2,4,5-T in diesel stem spray is recommended. An aqueous cover spray of equal strength (c. 4 kg/ha) is quicker acting but less persistent. For *C. sarmentosa*, where spraying is feasible, 2,4-D butyl ester 4 kg/ha for clones 1 m tall is recommended. Elsewhere, granular formulations of picloram 4.5 kg/ha or 2,4-D 11.2 kg/ha give similar control. *C. plumosa* is killed by granular formulations of dicamba 8.4 kg/ha, picloram 1.1 kg/ha or 2,4-D 8.1 kg/ha.

All species will recover from damage if treatment coverage is incomplete.
