Growth response of four *Camellia japonica* cultivars in acid soils of different pH, as affected by liming, and a commercial substrate

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C. japonica cv. 'Compacta Alba'

C. japonica cv. 'Triumphans'

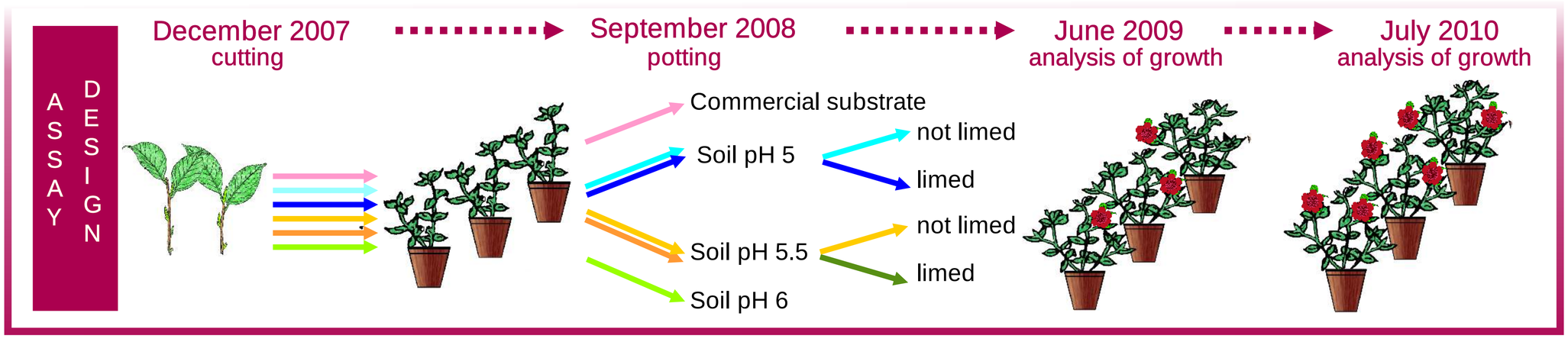
Despite there is scarce information about soil pH requirements of different Camellia species and cultivars, these plants are known to grow best in acid soils. Camellia plant production nurseries use substrates based on mixtures of composted pine bark and peat, that have acidic pH. When sold for gardening and landscaping, camellia plants are frequently transplanted to soils that can have a pH higher than 5.5 due either to natural soil characteristics or to soil liming. Lime application is a common agronomic practice in acid soils to improve macronutrient availability (especially phosphorus) and reduce aluminium toxicity for plants. The aim of this work was to study the growth response of four camellia cultivars in three acid soils as affected by liming, and as compared with a commercial substrate.

C. japonica cv. 'Rubescens Major'

C. japonica cv. 'C.M. Hovey'

~~~~~~MATERIAL AND METHODS~~~~~~

Before potting, three soils with pH 5.0, 5.5 and 6 respectively were air-dried and passed through a 5 mm mesh. Half volume of each soil was limed to reduce percentage Al saturation under 20%. Well-rooted one-year old plants of *Camellia japonica* 'Compacta Alba', 'Rubescens Major', 'Triumphans' and 'C.M. Hovey' were transplanted to pots filled with sand and the corresponding soil, either limed or not, in a ratio of 1:3 (in vol.), or with a pH 4 peat-based commercial substrate, and allowed to grow for one year.



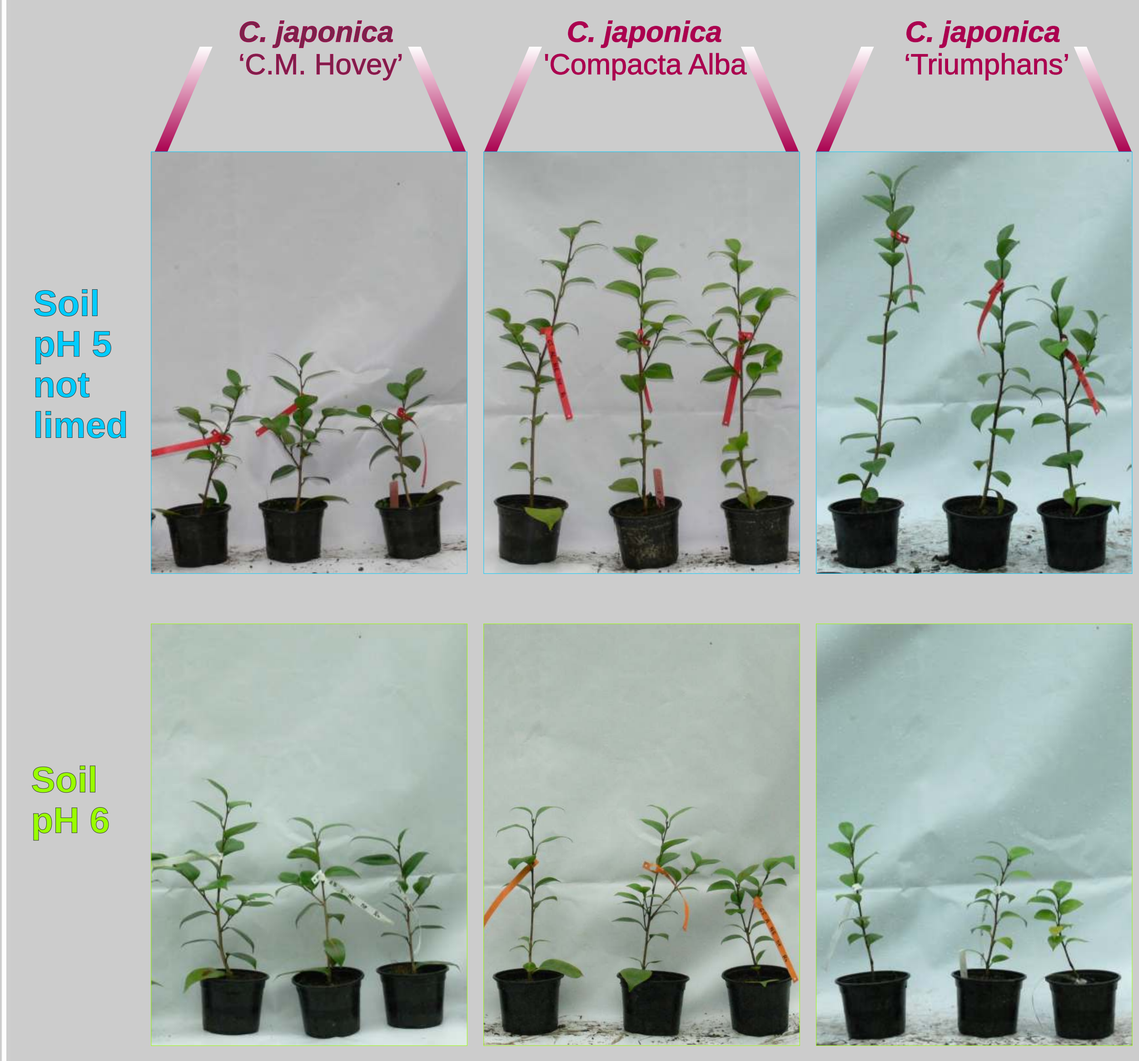
~~~~~~~~~~~~~~~~~~~~ RESULTADOS ~~~~~~~~~~~~~~~~~~~~

Table 1. Initial characteristics of the soils.

Soil	pH	C	OM	N	C/N	P	Ca	Mg	K	Al	Al sat.
	H_2O		%			mg kg^{-1}		cmol kg^{-1}			%
Areeiro-Lalín	5.04	5.89	10.15	0.39	15.06	49.42	0.87	0.07	0.11	2.65	64.25
Areeiro base	5.48	2.46	4.24	0.18	13.67	34.65	1.50	0.33	0.46	1.00	28.21
Lalín nº 1	5.91	3.08	5.31	0.30	10.10	5.60	1.38	0.72	0.15	0.60	19.19

Table 2. Growth of four *Camellia japonica* cultivars in three acid soils, as affected by liming, and a commercial peat-based substrate.

		Peat-based substrate	Areeiro-Lalín soil		Areeiro base soil		Lalín soil
Cultivar			Control	Limed	Control	Limed	
		pH 4	pH 5.0		pH 5.5		pH 6.0
C.M. Hovey	Plant height (cm)	21.6 a	7.3 b	6.9 b	6.7 b	9.0 b	8.5 b
	Nº new leaves	4.0 a	1.8 b	3.5 ab	3.4 ab	2.4 b	2.3 b
	Length of new shoots (cm)	6.7 a	2.1 c	4.1 b	4.1 b	3.2 bc	2.9 bc
	Internode length (cm)	1.78 a	1.48 b	1.12 c	1.20 c	1.38 bc	1.33 bc
Compacta Alba	Plant height (cm)	27.4 a	21.5 b	15.6 c	14.3 c	16.8 c	16.8 c
	Nº new leaves	4.4	3.4	4.0	3.8	3.4	5.2
	Length of new shoots (cm)	12.3 a	8.2 bc	9.0 b	7.6 c	6.6 c	10.4 ab
	Internode length (cm)	2.91 a	2.35 b	2.28 b	1.96 c	2.05 bc	2.09 bc
Rubescens major	Plant height (cm)	22.0 a	13.8 b	14.3 b	14.7 b	12.9 b	14.5 b
	Nº new leaves	5.0	3.8	4.0	4.3	3.8	4.6
	Length of new shoots (cm)	12.0	9.9	9.5	11.8	10.5	11.9
	Internode length (cm)	2.44 b	2.68 ab	2.38 b	2.90 a	2.59 ab	2.54 ab
Triumphans	Plant height (cm)	41.4 a	23.1 b	23.4 b	10.2 c	14.8 c	13.8 c
	Nº new leaves	6.0 a	5.4 a	4.8 ab	3.6 b	4.2 b	4.8 ab
	Length of new shoots (cm)	17 a	13.3 b	13.5 b	7.1 c	9.9 c	8.6 c
	Internode length (cm)	2.71 a	2.45 b	2.78 a	1.92 c	2.35 b	1.73 c



All cultivars grew best in the organic substrate, but showed different growth responses when cultivated in soil. 'C.M. Hovey' plants were extremely sensitive to soil pH as they hardly grew in any soil, either limed or not, compared to growth in the organic substrate. However the cultivar 'Rubescens Major' was fairly tolerant to increased soil pH, showing similar height, number of leaves and length of shoots in all soils, limed or not. Growth of 'Compacta Alba' and 'Triumphans' plants was lower as the soil pH increased.

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