Cutting grafting of Leucospermum 'Tango' on L. 'Spider'. Effect of wounding, rooting media, and reduction of foliar area of the scion.



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INTRODUCTION

Leucospermum 'Tango' (L. lineare 'Diadem' × L. glabrum 'Helderfontein') is one of the most cultivated pincushions in Tenerife, where many of the soils in areas suitable for cultivation of proteas are clayey. Leucospermum 'Spider' has been selected as rootstock for this type of soil (Rodríguez Pérez, 2007).

Different methods have been used in the propagation by grafting of Leucospermum, such as wedge grafting, modified chip budding and cutting-grafting (Brits, 1990, Ackerman et al., 1997). In the cutting-grafting method, scions are grafted onto unrooted cuttings of the rootstock, then tied to the rootstock and placed in propagating trays with mist, to promote simultaneous rooting of rootstock and graft consolidation, thus affording new grafted plants. In propagation by cuttings of *Leucospermum*, the standard rooting medium is

a mixture of peat moss and polystyrene grains, but good results have also been obtained by using coconut fiber alone or combined with polystyrene (Jacobs and Steenkamp, 1975, Malan, 1992 and 2012; Rodríguez-Pérez, 2007). The basal wounding technique, alone or combined with other treatments (IBA), has been used to stimulate root formation in some proteas (Rodríguez-Pérez, 1990; Rodríguez-Pérez et al., 1993; Rodríguez-Perez et al., 1997; Rodríguez-Pérez et al., 2003). Leaf area reduction of scions has been used to control leaf desiccation (Brits

1990). Leaf surface area is reduced to about 0.5 cm2. The present study was carried out to study the influence of wounding, rooting media, and reduction of foliar area of the scions on grafting cuttings of Leucospermum 'Tango' onto L. 'Spider'.

The results in percentages of grafted plants were subjected to variance analysis, after arcsine transformation. Significant differences in means were

separated using Duncan's multiple comparison test. Likewise, root length data

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of variance.





ions 5-7 cm long with 3-4 leaves

Cuttings of L. 'Spider', 15-20 cm long,

MATERIAL AND METHODS

The trial was carried out in winter-spring (November-April) at the Escuela T.S. de Ingeniería Agraria, University of La Laguna, Tenerife. L. 'Spider' was used The state ingent consistence of the state o

resulted from the combination of 2 types of rooting media: (a) coconut fiber and (b) a mixture of peat-moss and polystyrene grains (4:6 in volume) with or without reduction of scion leaves and with or without wounding of cuttings. The wedge-grafting technique was used. Scions 5-7 cm long with 3-4 leaves reduced to an area of 0.5 cm2, depending on which treatment, were prepared from terminal semi-hardwood stems of *L*. Tangoi. At the basal end, two sloping incisions 2 cm long were made, to form a wedge. Terminal semi-hardwood cuttings of *L*. "Spider', 15-20 cm long, from the current season's growth were employed as rootstocks. Cuttings were deheaded and several leaves from the base and the top were removed, leaving a few leaves on the central section of the cutting. A vertical incision was made at the top of the cutting. A tresh incision 1 cm long was made at the base of the unrooted cutting-grafts. Then they were wounded on not, depending on the treatment, and the basal 2 mm

Then they were wounded or not, depending on the treatment, and the basal 2 mm was dipped into a 4000 ppm solution of IBA for 5 s, followed by a dip in talc containing captan at 5% of active matter concentration, before planting them in containing captan at 5% of active matter concentration, before planting them in the rooting media in plastic propagating trays. The trays were plasted on a bed with bottom heat (22 \pm 2° C) under a fog system in a glasshouse, with 50% reduction of natural light. Day ventilation started when temperature rose above 20° C. Fog started to operate when the relative humidity of the air was less than 70 \pm 2%. Weekly, cutting-grafts were sprayed with captan, mancozeb, chlortalonil or iprodione to control possible diseases. From the sixth week after planting, the percentages of grafted plants were evaluated every two weeks, and the lengths of three roots over 3.5 cm of these plants were also measured.

RESULTS AND DISCUSSION

At 6 weeks from planting, the combination of scions with reduced leaves + unwounded cuttings, rooted in peat moss-polystyrene grains gave 47 % grafted plants, followed by the combination of scions with reduced leaves + unwounded cuttings, rooted in the same substrate (42%) (Table 1). León-Hernández et al. (2010) obtained in 6 weeks 80% of grafted plants of *Leucospermum* 'High Gold' onto *L. patersonii*. Ackerman et al. (1997) obtained in 4% weeks percentages of grafted plants of *L.* 'High Gold', using as a rootstock *L. patersonii*. 'Carmeli', which varied from 76.6 to 80%. At that stage of the assay, the mean percentage of grafted plants in the coconut fiber substrate was 20.2%, while in the peat moss-polystyrene grains medium it was 40.4%. The mixture of peat moss and polystyrene grains gave a higher quality rooting than the coconut fiber, since the three greatest roots were significantly longer in the initial rooting media than in the second one (P<0.05). However, as the assay progressed, that difference ceased, the length of the roots in the coconut fiber substrate gradually increasing.

Table 1. Percentages of grafted plants obtained in cutting-grafting of Leucospermum 'Tango' on L.'Spider' at 6, 12 and 16 weeks from planting.

Treatments	% of grafted plants			
	At 6 weeks	from At 12 weeks from	At 16 weeks from	
	planting	planting	planting	
UL, CF, W	28.4 ^{ab}	43.2ª	57.0ª	
UL, CF, UW	4.8 ^a	24.0ª	50.0ª	
RL, CF, W	19.3 ^{ab}	28.4ª	28.4 ^a	
RL, CF, UW	28.0 ^{ab}	31.5ª	31.5ª	
UL, P-P, W	36.0 ^{ab}	59.0ª	59.0ª	
UL, P-P, UW	42-0 ^b	75.0ª	81.0 ^a	
RL, P-P, W	36.5ab	36.5ª	36.5ª	
RL, P-P, UW	47.0 ^b	57.0ª	61.0ª	

Treatment notation: UL = unreduced leaves; RL = reduced leaves; CF = coconut fiber; P-P = peat-moss and polystyrene; UW = unwounded; W = wou

CONCLUSIONS

- Under the conditions of this experiment, it is advisable to use the L.'Spider' rootstock for propagation of the cultivar "Janoo' by cuttine-grafting, employing the standard technique for rooting, without reducing the scion altivar 'Tango' by cutting-grafting, employing the s af area, or wounding the cutting base of the cutting.
- Satisfactory percentages of grafted plants of L. 'Tango' on L. 'Spider' are thus obtained in a reasonable space of time

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At 12 weeks from planting, the combination of scions with unreduced leaves + unwounded cuttings rooted in peat moss polystyrene grains gave 75 % grafted plants, followed by the combination of scions with unreduced leaves + wounder cuttings, rooted in the same substrate (59%) (Table 1). wounded

At the end of the trial, at 16 weeks, the treatment that showed the highest percentage of grafted plants was the combination of scions with unreduced leaves + unwounded cuttings rooted in peat moss-polystyrene grains (81%) followed by the combination of scions with reduced leaves + unwounded cuttings rooted in peat moss-polystyrene grains (61%) (Table 1), which et he type of rooting medium, nor the reduction of the leaf, nor wounding favored the production of grafted plants. Nor were the interactions between these factors significant (Table 2).

Table 2. Influence of wounding, rooting media, and reduction of foliar area of the scions on

Treatments	Grafted plants (%)	
Rooting media		
Coconut fibre	41,4	
Peat moss- polystyrene	59.6	
Leaf state		
Unreduced	62.0	
Reduced	39.0	
Wounding		
Unwounded	44.9	
Wounded	56.2	
Significance		
Rooting media	ns	
Leaf state	DS	
Wounding	ns	
Rooting media × leaf state	DS	
Rooting media × wounding	ns	
Leaf state × wounding	ns	
Rooting media × leaf state × wounding	ns	

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were transformed using the square-root transformation (\sqrt{X} + 0.5) before analysis

> The trays were placed n a bed with bottom heat (22 ± 2° C) u fog system in a glass

> > Detail of the different treatments: T6 (scions with unreduced leaves +the mixture of peat moss and polystyrene grains + unwounded cuttings) y T3 (scions with reduced leaves+ coconut fiber+ wounded cuttings), respectively (from left to right).

