Figure S1. Location of sites considered in this study.
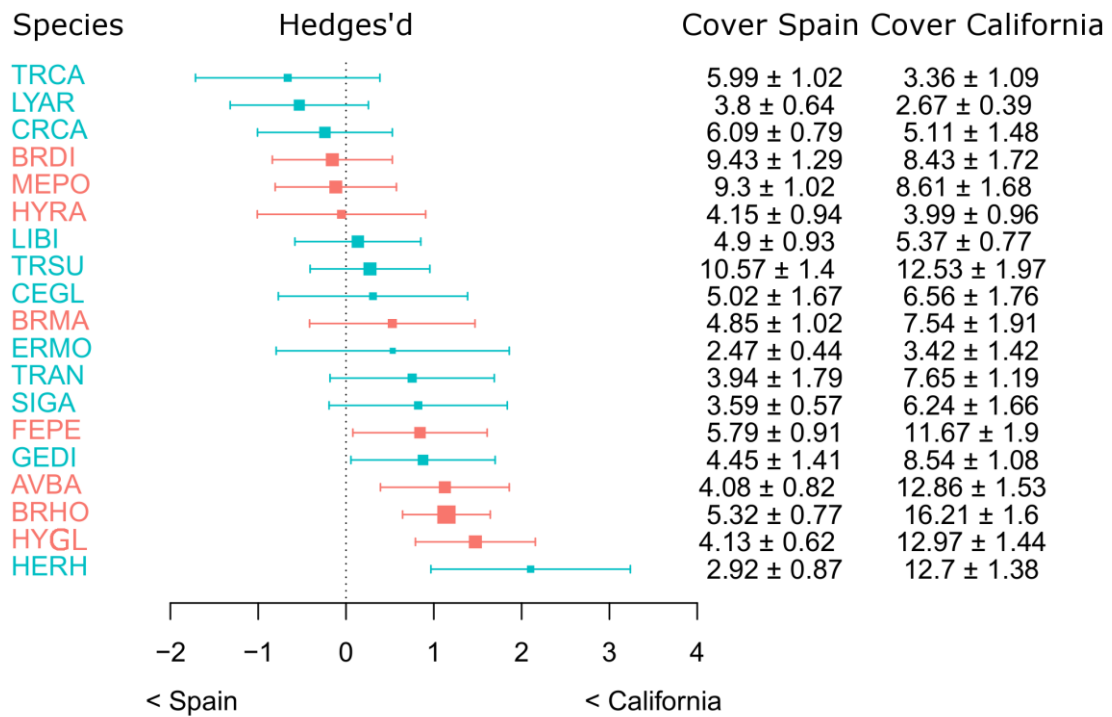
Figure S2. Hedges'd for comparison of shared species abundance in Spanish and Californian plots. Pest species are in red, and non-pest species in blue according to CAL-IPC. We indicate mean relative cover per occupied plot ± SE.

Table S1. Species found in the surveys. We recorded 139 species in Spain and 95 in California. In Spain, all species were native. Colonizers are Spanish origin species established in California. In California, we found 43 native species, and all exotic species were native to Spain (i.e., colonizers).

species	family	origin	level of invasion in California
Achryrachaena mollis	Asteraceae	Californian native	-
Aegilops geniculata	Poaceae	Colonizer	non-pest
Aegilops triuncialis	Poaceae	Colonizer	pest
Agrostis pourretii	Poaceae	Spanish non-colonizer	-
Aira caryophyllea	Poaceae	Colonizer	non-pest
Amsinckia menziesii	Boraginaceae	Californian native	-
Anacyclus radiatus	Asteraceae	Spanish non-colonizer	-
Andryala integrifolia	Asteraceae	Spanish non-colonizer	-
Anthoxanthum odoratum	Poaceae	Colonizer	pest
Arisarum simorrhinum	Araceae	Spanish non-colonizer	-
Asphodelus ramosus	Xanthorrhoeaceae	Spanish non-colonizer	-
Avena barbata	Poaceae	Colonizer	pest
Bellis annua	Asteraceae	Spanish non-colonizer	-
Bellis perennis	Asteraceae	Colonizer	non-pest
Beta vulgaris	Quenopodiaceae	Colonizer	non-pest
Biscutella sp	Brassicaceae	Spanish non-colonizer	-
Biserrula pelecinus	Fabaceae	Spanish non-colonizer	-
Brachypodium distachyon	Poaceae	Colonizer	pest

Briza maxima	Poaceae	Colonizer	pest
Briza minor	Poaceae	Colonizer	non-pest
Bromus diandrus	Poaceae	Colonizer	pest
Bromus hordeaceus	Poaceae	Colonizer	pest
Bromus madritensis	Poaceae	Colonizer	pest
Bromus tectorum	Poaceae	Colonizer	pest
Calandrinia ciliata	Montiaceae	Californian native	-
Calandrinia menziesii	Montiaceae	Californian native	-
Calandrinia sp	Montiaceae	Californian native	-
Carduncellus caeruleus	Asteraceae	Spanish non-colonizer	-
Carduus bourgeanus	Asteraceae	Colonizer	pest
Carduus tenuifolius	Asteraceae	Spanish non-colonizer	-
Carlina corymbosa	Asteraceae	Spanish non-colonizer	-
Carlina sp	Asteraceae	Spanish non-colonizer	-
Carthamus lanatus	Asteraceae	Colonizer	pest
Castilleja attenuata	Orobanchaceae	Californian native	-
Castilleja campestris	Orobanchaceae	Californian native	-
Centaurea pullata	Asteraceae	Spanish non-colonizer	-
Centaurium maritimum	Gentianaceae	Spsnish native	-
Cerastium glomeratum	Caryophyllaceae	Colonizer	non-pest
Chaetopogon fasciculatus	Poaceae	Spanish non-colonizer	-
Chamaemelum mixtum	Asteraceae	Spanish non-colonizer	-
Chlorogalum pomeridianum	Asparagaceae	Californian native	-
Cichorium endivia	Asteraceae	Colonizer	non-pest
Clarkia sp	Onagraceae	Californian native	-
Coleostephus myconis	Asteraceae	Spanish non-colonizer	-
Convolvulus meonanthus	Convolvulaceae	Spanish non-colonizer	-
Crassula connata	Crassulaceae	Californian native	-
Crepis capillaris	Asteraceae	Colonizer	non-pest
Croton sp	Euphorbiaceae	Californian native	-
Cynara humilis	Asteraceae	Spanish non-colonizer	-
Cynodon dactylon	Poaceae	Colonizer	pest
Dactylis glomerata	Poaceae	Colonizer	pest
Danthonia californica	Poaceae	Californian native	-
Daucus muricatus	Apiaceae	Spanish non-colonizer	-
Daucus pusillus	Apiaceae	Spanish non-colonizer	-
Dichelostemma capitatum	Asparagaceae	Californian native	-
Diplotaxis catholica	Brassicaceae	Spanish non-colonizer	-
Diplotaxis sp	Brassicaceae	Spanish non-colonizer	-
Drimia maritima	Asparagaceae	Spanish non-colonizer	-
Echium plantagineum	Boraginaceae	Colonizer	pest
Erodium aethiopicum	Geraniaceae	Spanish non-colonizer	-
Erodium botrys	Geraniaceae	Colonizer	non-pest
Erodium brachycarpum	Geraniaceae	Colonizer	non-pest
Erodium cicutarium	Geraniaceae	Colonizer	pest
Erodium moschatum	Geraniaceae	Colonizer	non-pest

Eryngium tricuspidatum	Apiaceae	Spanish non-colonizer	-
Eschscholzia californica	Papaveraceae	Californian native	-
Eschscholzia lobbii	Papaveraceae	Californian native	-
Euphorbia akenocarpa	Euphorbiaceae	Spanish non-colonizer	-
Euphorbia exigua	Euphorbiaceae	Colonizer	non-pest
Fedia cornucopiae	Caprifoliaceae	Spanish non-colonizer	-
Festuca bromoides	Poaceae	Colonizer	non-pest
Festuca microstachys	Poaceae	Californain native	-
Festuca perennis	Poaceae	Colonizer	pest
Galactites tomentosa	Asteraceae	Spanish native	-
Galium parisiense	Rubiaceae	Colonizer	non-pest
Galium sp	Rubiaceae	Spanish non-colonizer	-
Gaudinia fragilis	Poaceae	Colonizer	non-pest
Geranium dissectum	Geraniaceae	Colonizer	non-pest
Geranium molle	Geraniaceae	Colonizer	non-pest
Gilia tricolor	Polemoniaceae	Californian native	-
Gladiolus italicus	Iridaceae	Colonizer	non-pest
Hedypnois rhagadioloides	Asteraceae	Colonizer	non-pest
Hedysarum coronarium	Fabaceae	Spanish non-colonizer	-
Hordeum marinum	Poaceae	Colonizer	pest
Hordeum murinum	Poaceae	Colonizer	pest
Hymenocarpos lotoides	Fabaceae	Spanish non-colonizer	-
Hypochaeris glabra	Asteraceae	Colonizer	pest
Hypochaeris radicata	Asteraceae	Colonizer	pest
Juncus bufonius	Juncaceae	Cosmoppolitan native	-
Juncus sp	Juncaceae	Spanish non-colonizer	-
Lamarckia aurea	Poaceae	Colonizer	non-pest
Lathyrus angulatus	Fabaceae	Colonizer	non-pest
Leontodon salzmannii	Asteraceae	Spanish non-colonizer	-
Leontodon taraxacoides	Asteraceae	Colonizer	non-pest
Lepidium nitidum	Brassicaceae	Californian native	-
Linum bienne	Linaceae	Colonizer	non-pest
Logfia gallica	Asteraceae	Colonizer	non-pest
Lotus conimbricensis	Fabaceae	Spanish non-colonizer	-
Lotus corniculatus/tenuis	Fabaceae	Colonizer	non-pest
Lotus strigosus	Fabaceae	Spanish non-colonizer	-
Lotus subbiflorus	Fabaceae	Spanish non-colonizer	-
Lupinus bicolor	Fabaceae	Californian native	-
Lupinus sp	Fabaceae	Californian native	-
Lysimachia arvensis	Primulaceae	Colonizer	non-pest
Matricaria discoidea	Asteraceae	Californian native	-
Medicago doliata	Fabaceae	Spanish non-colonizer	-
Medicago orbicularis	Fabaceae	Colonizer	non-pest
Medicago polymorpha	Fabaceae	Colonizer	pest
Medicago scutellata	Fabaceae	Colonizer	non-pest
Misopates orontium	Plantaginaceae	Colonizer	non-pest

Molineriella minuta	Poaceae	Spanish non-colonizer	-
Muilla transmontana	Themidaceae	Californian native	-
Nassella pulchra	Poaceae	Californian native	-
Ononis sp	Fabaceae	Spanish non-colonizer	-
Ornithogalum narbonense	Asparagaceae	Spanish non-colonizer	-
Ornithopus compressus	Fabaceae	Spanish non-colonizer	-
Ornithopus pinnatus	Fabaceae	Colonizer	non-pest
Othospermum glabrum	Asteraceae	Spanish non-colonizer	-
Petrorhagia velutina	Caryophyllaceae	Colonizer	non-pest
Phalaris aquatica	Poaceae	Colonizer	pest
Plagiobothrys fulvus	Boraginaceae	Californian native	-
Plagiobothrys greenei	Boraginaceae	Californian native	-
Plagiobothrys nothofulvus	Boraginaceae	Californian native	-
Plantago bellardii	Plantaginaceae	Spanish non-colonizer	-
Plantago coronopus	Plantaginaceae	Colonizer	non-pest
Plantago lagopus	Plantaginaceae	Spanish non-colonizer	-
Plantago lanceolata	Plantaginaceae	Colonizer	pest
Plantago serraria	Plantaginaceae	Spanish non-colonizer	-
Poa sp	Poaceae	Spanish non-colonizer	-
Polycarpon tetraphyllum	Caryophyllaceae	Colonizer	non-pest
Ranunculus californicus	Ranunculaceae	Californian native	-
Ranunculus paludosus	Ranunculaceae	Spanish non-colonizer	-
Raphanus raphanistrum	Brassicaceae	Colonizer	non-pest
Raphanus sativus	Brassicaceae	Colonizer	pest
Rapistrum rugosum	Brassicaceae	Colonizer	non-pest
Rumex acetosella	Polygonaceae	Colonizer	pest
Rumex bucephalophorus	Polygonaceae	Colonizer	non-pest
Rumex conglomeratus	Polygonaceae	Colonizer	non-pest
Rumex pulcher	Polygonaceae	Colonizer	non-pest
Scolymus hispanicus	Asteraceae	Colonizer	pest
Scorpiurus vermiculatus	Fabaceae	Spanish non-colonizer	-
Senecio vulgaris	Asteraceae	Colonizer	non-pest
Serapias parviflora	Orchidaceae	Spanish non-colonizer	-
Sherardia arvensis	Rubiaceae	Colonizer	non-pest
Silene colorata	Caryophyllaceae	Spanish non-colonizer	-
Silene gallica	Caryophyllaceae	Colonizer	non-pest
Silybum marianum	Asteraceae	Colonizer	pest
Sisymbrium officinale	Brassicaceae	Colonizer	non-pest
Sisyrinchium bellum	Iridaceae	Californian native	-
Sonchus asper	Asteraceae	Colonizer	non-pest
Spergularia rubra	Caryophyllaceae	Colonizer	non-pest
Stachys arvensis	Lamiaceae	Colonizer	non-pest
Stachys ocymastrum	Lamiaceae	Spanish non-colonizer	-
Stegia trimestris	Malvaceae	Spanish non-colonizer	-
Stellaria media	Caryophyllaceae	Colonizer	non-pest
Stipa capensis	Poaceae	Colonizer	pest

Taeniatherum caputmedusae	Poaceae	Colonizer	pest
Tetragonolobus maritimus	Fabaceae	Spanish non-colonizer	-
Thysanocarpus curvipes	Brassicaceae	Californian native	-
Tolpis barbata	Asteraceae	Colonizer	non-pest
Tragopogon sp	Asteraceae	Spanish non-colonizer	-
Trifolium angustifolium	Fabaceae	Colonizer	non-pest
Trifolium arvense	Fabaceae	Colonizer	non-pest
Trifolium bocconei	Fabaceae	Spanish non-colonizer	-
Trifolium campestre	Fabaceae	Colonizer	non-pest
Trifolium cherleri	Fabaceae	Spanish non-colonizer	-
Trifolium depauperatum	Fabaceae	Californian native	-
Trifolium dubium	Fabaceae	Colonizer	non-pest
Trifolium fragiferum/hybridum	Fabaceae	Colonizer	non-pest
Trifolium glomeratum	Fabaceae	Colonizer	non-pest
Trifolium hirtum	Fabaceae	Colonizer	pest
Trifolium microcephalum	Fabaceae	Californian native	-
Trifolium obtusiflorum	Fabaceae	Californian native	-
Trifolium pratense	Fabaceae	Colonizer	non-pest
Trifolium scabrum	Fabaceae	Spanish non-colonizer	-
Trifolium sp	Fabaceae	Californian native	-
Trifolium squarrosum	Fabaceae	Spanish non-colonizer	-
Trifolium stellatum	Fabaceae	Colonizer	non-pest
Trifolium striatum	Fabaceae	Colonizer	non-pest
Trifolium subterraneum	Fabaceae	Colonizer	non-pest
Trifolium tomentosum	Fabaceae	Colonizer	non-pest
Trifolium variegatum	Fabaceae	Californian native	-
Trifolium willdenovii	Fabaceae	Californian native	-
Triteleia laxa	Themidaceae	Californian native	-
Tuberaria guttata	Cistaceae	Colonizer	non-pest
Vicia benghalensis	Fabaceae	Colonizer	non-pest
Vicia lutea	Fabaceae	Colonizer	non-pest
Vicia sativa	Fabaceae	Colonizer	non-pest
Viola sp	Violaceae	Spanish non-colonizer	-
Vulpia geniculata	Poaceae	Spanish non-colonizer	-
Vulpia myuros	Poaceae	Colonizer	non-pest
Vulpia sp	Poaceae	Spanish non-colonizer	-

We characterised soil nutrient in each grassland by measuring N concentration, ratio C:N ratio, available phosphorus and organic matter. To this end, we collected five soil cores per grassland, of the top 20 cm of soil where nutrient uptake by plants mostly occurs. Then, we dried the samples in the oven, grounded and sieved to 2 mm. We estimated total nitrogen by Kjeldahl digestion, organic matter by the Walkley and Black method, and available phosphorus by the Olsen method. We evaluated if there were differences in soil C:N, P and OM between regions by fitting linear mixed models with region and site as fixed and random factors, respectively. The results did not show any regional significant difference in these soil characteristics between Spain and California. Instead, most variability was explained by differences among grassland plots within the sites.

Table S2. Soil properties of studied sites.

	Fixed effect	Random effect	Df	F	p	California	Spain
C:N	Region	Grassland	1,6	0.22	0.65	12.07±0.35	12.30±0.49
P	Region	Grassland	1,6	0.05	0.83	9.13±2.58	9.93±3.64
OM	Region	Grassland	1,6	0.22	0.66	3.97±0.67	3.43±0.95
N	Region	Grassland	1,6	0.38	0.56	0.19±0.03	0.17±0.05