Garry oak ecosystems recovery team

Annotated Bibliography on the Ecology and Management of Invasive species:

Silene gallica
Common Catchfly

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for the Garry Oak Ecosystems Recovery Team

September 2010

Funding provided by the Habitat Stewardship Program for Species at Risk of Environment Canada

Environment Canada Environnement Canada

Peer-reviewed sources

Batilla, D., B.C. Kruk and R.L. Benech-Arnold. 2000. Very early detection of canopy presence by seeds through perception of subtle modifications in red:far red signals. Functional Ecology 14: 195-202.

Abstract: **1.** An early inhibition of germination in seeds of *Silene gallica* and *Brassica campestris* which were continuously exposed to the light environment under an establishing wheat canopy, was observed in two different experiments. Inhibition occurred *c.* 15 days after crop emergence, when the canopy leaf area index (LAI) was below one and the red (R):far-red (FR) ratio recorded under the canopy was well above 0·8. **2.** This inhibitory effect was either overcome by filtering FR light through a solution of CuSO4 or could be artificially imposed by simulating the canopy with filters yielding a R:FR ratio of 0·95 and 0·8. These results show that light subtly enriched with FR was the environmental factor regulating germination below the developing canopy. **3.** Exposure to canopy-filtered light pulses of 1 h (presumably sufficient to saturate a low fluence response, LFR) did not inhibit seed germination. Moreover, such treatment promotes germination up to an extent similar to that previously observed in the laboratory after a saturating pulse of R light. Instead, prolonged exposures were required to inhibit germination. These results, together with the relatively high R:FR ratios measured below the canopy in early stages of its establishment, suggest that a high irradiance response (HIR) would be involved in such a regulation. **4.** This capacity to detect small environmental light-quality modifications when exposed to high irradiances, would allow the seeds from these species to detect the presence of a canopy in the very early stages of its establishment and to stay in 'safe' pre-germination phases when the probability of successful seedling establishment is low

Bourdot, G.W., G.A. Hurrell and D.V. Saville. 1998. Weed flora of cereal crops in Canterbury, New Zealand. New Zealand Journal of Crop and Horticultural Science 26: 233-247.

Abstract: Weed communities in Canterbury, New Zealand, cereal crops were characterised in the 1990-91, 1991-92, and 1992-93 growing seasons by measuring species population densities and harvest- time biomass in 39 and 45 fields respectively of Wheat (*Triticum aestivum*) and Barley (*Hordeum vulgare*) in the absence of herbicide treatments. A total of >57 species in >49 genera were recorded representing a total of 23 families with Asteraceae, Brassicaceae, Caryophyllaceae, Fabaceae, Poaceae, and Polygonaceae predominating. Annuals were more common (29 taxa) than perennials (12 taxa) whereas biennials (4 taxa) were least frequent. Seven species occurred in >50% of young crops: *Trifolium* sp. (mainly *T. repens*) (94% of crops), *Capsella bursa-pastoris* (85%), *Viola arvensis* (69%), *Stellaria media* (69%), *Polygonum aviculare* (67%), *Chenopodium album* (67%), and *Anagallis arvensis* (63%). Weed population densities varied greatly between species but there was less variation between years and crop

type. Above harvesting height at crop maturity, most weed species occurred less frequently and just eight species occurred with a frequency >20%; *Polygonum convolvulus* (34% of crops), *P. aviculare* (33%), *Chenopodium album* (28%), grasses (mainly *Elytrigia repens)* (28%), *Crepis* sp. (mainly *C. capillaris)* (26%), *Viola arvensis* (23%), *Sonchus oleraceus* (21%), and *Vicia* sp. (21%). Weeds above harvesting height occurred more frequently in Wheat than in Barley and their biomass was on average, greater in the wheat crops. The numbers of weed species per field varied from 6 to 16 and there was a strong trend toward co-dominance by several species.

Fairbarns, M. and J.M. Egger. 2007. *Castilleja victoriae* (Orobranchaceae): a new rare species from southeastern Vancouver Island, British Columbia, Canada, and the adjacent San Juan Islands, Washington, U.S.A. Madrono 54 (4): 334-342.

Abstract: *Castilleja victoriae* is described from the vicinity of southwestern Victoria, southern Vancouver Island, British Columbia, Canada and from San Juan Co., Washington, U.S.A. It is an annual member of subg. Colacus (Jeps.) T.I. Chuang & Heckard, sect. Oncorhynchus (Lehm.) T.I. Chuang & Heckard, formerly placed in the genus Orthocarpus Nutt. It is apparently most closely related to either *Castilleja ambigua* Hook. & Arn. or *Castilleja tenuis* (A. Heller) T.I. Chuang & Heckard. The new species differs primarily in its uniformly dull reddish-brown floral bracts and calyces, bicolored and unspotted corollas, and restrictive habitat requirements. Several historic populations are extirpated, and of the three extant populations only one consists of enough individuals in a protected location to be considered reasonably secure. We advocate additional surveys of its limited habitat and conservation measures to protect the species.

Gibson, R.H., Nelson, I.L., Hopkins, G.W., Hamlett, B.J. and Memmott, J. 2006. Pollinator webs, plant communities and the conservation of rare plants: arable weeds as a case study. Journal of Applied Ecology 43: 246-257.

Abstract: **1.** Little is known about the pollinators of rare plants, which is cause for concern given that pollination is essential for the long-term survival of most plant species. The aim of this study was to determine the probable pollinators of three species of rare arable weed: Red Hemp-nettle *Galeopsis angustifolia*, Small-flowered Catchfly *Silene gallica* and spreading hedge-parsley *Torilis arvensis*. Species of arable weed are among those suffering the greatest declines in the UK. **2.** Five field sites were chosen, two of which were sampled in 2 years. Visitation and pollen transport webs were constructed for the entire plant–pollinator community at each site. Visitation webs described the frequency with which each insect species visited each plant species. Pollen transport webs quantified which insect species transported the pollen of which plant species. **3.** A wide range of insect species visited the three plant species. A pollinator importance index was calculated that combined information on both the relative abundance of each insect carrying the pollen of the rare plant and its pollen fidelity. Using this method *Galeopsis angustifolia* was most likely to be pollinated by

Bombus pascuorum at one site and *Sphaerophoria scripta* at another. *Silene gallica* was also likely be pollinated by *Sphaerophoria scripta*. **4.** The pollinator fauna of the three plant species varied considerably across their geographical range, but less from one year to the next. **5.** *Synthesis and applications*. All three species of rare plant were linked to other plant species in the community by shared pollinators. In many cases these other plant species constituted the primary food sources for the shared pollinators. Therefore, the longterm survival of rare plant populations is likely to depend on the more common plant species in the community. We recommend that management of the rare plants studied here should also include the protection and management of populations of some of the more common plant species in their respective communities.

Greuter, W. 1995. Proposal to Conserve the Name *Silene gallica* L. (Caryophyllaceae) against Several Synonyms of Equal Priority. Taxon 44 (1): 102-104.

Abstract: In the final installment of Ball's publication, there is however an index in which *Silene decipiens* is mentioned as a plain binomial, neither set off in special type nor subordinated to *S. nocturna*. In my opinion (which will likely be challenged by some, who may claim that the binomial is not accepted as a species name by Ball, hence not validly published) this constitutes valid publication, through indirect reference via the main text, of *S. decipiens* (Ball) Ball (in J. Linn. Soc. London, Bot. 16: 768. 1878). This is today considered a minor variant of *S. nocturna* (*f. decipiens* (Ball) Maire in Encycl. Biol. 62: 66. 1963). More importantly, it does make *S. decipiens* Barcelo an illegitimate later homonym. Normally, a name change introduced 6 years ago for perfectly valid nomenclatural reasons, when affecting an economically unimportant species, would not be challenged even now when the option for dealing with the problem by conservation exists. But, not only has usage not shifted appreciably since 1989; even in the future it is unlikely to shift toward a new, stable state. Doubts surrounding the legitimacy of *Silene decipiens* Barcelo, and uncertainty as to which other name (if any) may be available to designate the species, make a strong case for a conservation proposal such as is here submitted. The specimen suggested as conserved type is complete, unambiguous, well preserved, and belongs to a collection represented by duplicates in many of the important herbaria of Europe.

James, T.K., A. Rahman and J.S. Gray. 2001. Control of weeds in imidazolinone tolerant maize with imazethapyr plus imazapyr. New Zealand Plant Protection 54: 162-167.

Abstract: Three trials conducted in Waikato evaluated the use of the proprietary imidazolinone herbicide mixture of imazethapyr plus imazapyr for weed control in imidazolinone tolerant (IT) maize crops. A range of herbicide rates, application times and adjuvants were evaluated. The results show that imazethapyr/imazapyr herbicide mixture was very effective in controlling a variety of both monocotyledonous and dicotyledonous annual weeds. Some perennial weeds present in the trials were also well controlled. Imazethapyr/imazapyr was more effective when applied early post-emergence and Hasten® was the most effective adjuvant for increasing the efficacy of

imazethapyr/imazapyr. The IT maize crop and final grain yields were not affected by these herbicides.

Loubser, J.W. 1998. Activity of chlorsulfuron, ethoxysulfuron and sulfosulfuron towards selected cereal weeds. Applied Plant Science 12 (2): 57-59.

Abstract: The sensitivity of selected cereal weeds towards chlorsulfuron, ethoxysulfuron and sulfosulfuron was evaluated in a glasshouse. Sulfosulfuron significantly reduced the dry-mass production of several dicot and grass weeds. Chlorsulfuron and ethoxysulfuron did not affect any of the grass weed species. Ethoxysulfuron had no effect on *Spergula arvensis* and *Silene gallica*. Ethoxysulfuron also did not significantly reduce the dry-matter production of *Amaranthus hibridus*, *Cerestium capense, Linaria spuria, Medicago polymorpha, Oxalis pes-caprae, Polygonum aviculare and Raphanus raphanistrum.*

Parsons, D.J. 1989. Effects of varying fire regimes on annual grasslands in the southern Sierra Nevada of California. Madrono 35: 154-168.

Abstract: Effects of up to three successive spring and fall burns on competition and biomass of the predominantly non-native grasslands of the southern Sierra Nevada foothills were evaluated. Fall and spring burning regimes increased the number and biomass of both alien and native forbs. No native grass species became established following treatments. Thus, whereas the biomass of alien grass species can be reduced by repeated burning, they will be replaced by increases in both alien and native forbs. Changes seen following one or two burns (spring or fall) were not sustained following cessation of the burning treatment.

Other published sources

COSEWIC. 2006. COSEWIC Assessment and status report on the Coast Microseris (*Microseris bigelovii*). Prepared by M. Fairbarns, A. MacDougall, A. Ceska and O. Ceska. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 26 pp.

Summary:
Common name
Coast microseris
Scientific name
Microseris bigelovii
Status
Endangered
Reason for designation
A small annual herb present in a few fragmented sites within a narrow coastal fringe on southeast Vancouver Island in a densely inhabited urbanized region. Development,

recreational activities, site management practices and competition from invasive alien plants continue to impact the species.

Occurrence

British Columbia

Status history

Designated Endangered in April 2006. Assessment based on a new status report.

DiTomasa, J.M. and E. Healy. 2007. Weeds of California and other western states Volume 1. ANR Publications: Richmond, CA. p.582.

Kruik, B.C. and R.L.Benech-Arnold. 2000. Field emergence patterns of *Silene gallica* in relation to changes in dormancy and germination responses to temperature. Abstracts of the III International Weed Science Congress Foz do Iguassu, Brazil 6 –11 June 2000.

Abstract: We present results from experiments on the facultative winter annuals *Silene gallica* i) to determine thermal conditions that induce or release dormancy, ii) to investigate to what extent changes in dormancy level resulting from those thermal conditions explain the seasonal pattern of emergence, and iii) to estimate required thermal time and base temperature for the germination of non-dormant seeds. Recently shed seeds of *Silene gallica* presented a high dormancy level. Seeds were buried in the soil of the beginning of the summer. When seeds were exhumed in the autumn, they showed a very low dormancy level, and were able to germinate under a wide thermal range. The dormancy level remained low for seeds exhumed in winter and in spring, thus suggesting that low winter temperatures did not induce secondary dormancy as expected for a winter annual. Dormancy relief was enhanced by dry storage at 25 C, and the response to low temperature was different depending on moisture conditions; prolonged exposure to moist-chilling maintained the high dormancy level of the population, while dry storage at 4 C relieved dormancy in the long term. Changes in the thermal range permissive for germination as a result of dormancy modifications explained to a large extent the timing of the emergence periods observed in the field. Thermal time required for germination varied with dormancy while base temperature and optimal temperature for germination were constant (Tb50 C and To512 C).

Alaback, P., J. Antos, T. Goward, K. Lertzman, A. Mackinnon, J. Pojar, R. Pojar, A. Reed, N. Turner and D. Vitt. 2006. Plants of Coastal British Columbia. Pojar, J. and A. Mackinnon (Eds.) B.C. Ministry of Forests and Lone Pine Publishing: Vancouver, BC.p.142.

Rodwell, J.S and C.D. Pigott.2000.British plant communities Volume 5: Maritime communities and vegetation of open habitats. Cambridge University Press: Cambridge, UK. p.338.

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Spooner, A., J. Carpenter, C.Smith, and K. Spence. 2008. *Silene gallica* L. French Catchfly Sp.Pl. 1:417 (1753). FloraBase: the Western Australia Flora http://florabase.calm.wa.gov.au. Department of Environment and Conservation; Western Australian herbarium.

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