

French serradella

Dr Brian Dear

Principal Research Scientist, Pasture Genetics and Improvement Unit, Wagga Wagga

Belinda Hackney

Research Agronomist, Pasture Genetics and Improvement Unit, Wagga Wagga

Graham Crocker

Senior Research Agronomist, Pasture Genetics and Improvement Unit, Tamworth

Graeme Sandral

Senior Research Agronomist, Pasture Genetics and Improvement Unit, Wagga Wagga

Introduction

French serradella (*Ornithopus sativus*), also known as pink serradella is an annual legume native to the Mediterranean region.

It was first released in Australia in 1996 where it was grown mainly in combination with yellow serradella. The early forms of French serradella were very soft-seeded and were grown in mixtures with the very hard-seeded yellow serradellas to improve early pasture productivity. These soft-seeded types tended to disappear from pastures within 2–3 years as they were very susceptible to high seedling mortality caused by 'false breaks' (out of season rainfall without follow-up rain). In soft-seeded varieties, this rapidly depletes soil seed reserves. Over time, French serradella was replaced by yellow serradella in these pastures.

In recent years there has been considerable French serradella research and development in Australia, resulting in the release of new varieties with higher levels of hard seed which are proving to be more persistent than previously available varieties.

Adaptation

French serradella has been successfully grown in areas receiving a minimum of 375 mm average annual rainfall in southern NSW and 475 mm in northern NSW.

French serradella is well adapted to soils with sandy to clay-loam textures with a pH (CaCl_2) of 4–7. French serradella grows well in soils with exchangeable aluminium levels of up to 30%, although production can be enhanced on very acidic soils with the use of lime. French serradella has very low tolerance of soils with high levels of exchangeable manganese. It does not tolerate waterlogging and is not suitable for growing on sodic soils.

French serradella can be grown in soils suited to its requirements on the slopes and plains in wheat-belt and tableland areas of NSW where it may form part of a long-term pasture providing high quality herbage for grazing livestock. Alternatively, it can be used as a special purpose fodder conservation break-crop enabling farmers to conserve fodder for feed-gaps and drought periods as well as supplying nitrogen and a disease break for following crops.

Hard-seeded cultivars should be grown where the pasture is required to regenerate from seed in following years. This is particularly important in areas that receive out of growing season rainfall, which will cause premature germination and deplete seed reserves (such as in northern NSW, which has a summer dominant rainfall pattern).

Description

French serradella has pinnate (fern-like) leaves. Individual leaflets are up to 10 mm long and 3–4 mm



Figure 1. French serradella has pink flowers and pinnate leaves

wide. Leaflets and stems are covered in fine hairs. In the vegetative state, French serradella is similar in appearance to biserrula (*Biserrula pelecinus*); however the tips of the leaflets of French serradella are pointed while those of biserrula are indented.

French serradella has small pale pink flowers. Each inflorescence consists of about 6 flowers and usually sets 3–6 pods. Each pod consists of 6–7 segments which readily separate at maturity. Pods are usually 15–40 mm long and 4–5 mm wide, with segments between the seeds very obvious. Seeds are oblong in shape and about 3 mm x 1.5 mm in size with approximately 400,000 seeds/kg and may be yellow or red-brown depending on variety.

Varieties

Plant Breeder's Rights

Some of the varieties discussed here are covered by Plant Breeder's Rights (PBR). Plant Breeder's Rights are exclusive commercial rights to a registered variety of plant. Seed of varieties protected by PBR may not be produced for sale, or sold, without the authority of the owner.

Cadiz[®] was developed by the Department of Agriculture Western Australia from material collected in South Africa. It is a very soft-seeded variety and highly susceptible to seedling loss in the event of false breaks. Because of this, Cadiz is most suited to use as a one-year specialist crop, for example as a disease break in a cropping rotation and for fodder conservation purpose. It has also been used widely sown as a companion with yellow serradella (which tends to be very hard-seeded). Cadiz provides production in the first 1–2 years while the seed bank of yellow serradella is building up. Cadiz is a mid season maturing type, flowering approximately 125 days after a mid-May sowing at Wagga Wagga, making it similar in maturity time to Seaton Park sub clover. Cadiz was released in 1997. Seeds are red-brown.

Erica[®] was developed in the National Annual Pasture Legume Improvement Program (NAPLIP) under the code 99FSH3. It was selected from populations of Cadiz for higher levels of hard seed, desirable pod characteristics for seed harvest and herbage production. Erica is a prostrate to semi-erect variety which is well suited to grazing purposes although if ungrazed it will grow tall enough to be used for fodder conservation. It is similar in maturity time to Cadiz flowering about 121 days after a mid May sowing. Seeds are yellow in colour. Erica was released in 2004.

Margurita[®] was developed in the NAPLIP program under the code 99FSH7 along with Erica. It was selected from populations of Cadiz for higher levels of hard seed, desirable pod characteristics for seed

harvest and herbage production. Margurita is a more erect variety than Erica and is better suited to fodder conservation. Margurita is similar in maturity time to Cadiz and Erica though has two distinct peaks in flowering and flowers over a longer period than Erica. Seeds are yellow in colour. It was released in 2004.

Grasslands Koha is a soft-seeded variety developed in New Zealand. It is a very late maturing variety. Seeds are red-brown. Being soft-seeded, regeneration in the second year can be poor if seed germinates prematurely as a result of rain in late summer to early autumn.

Serratas is a soft-seeded variety bred in Tasmania and is reputed to be the most cold tolerant of the French serradellas.

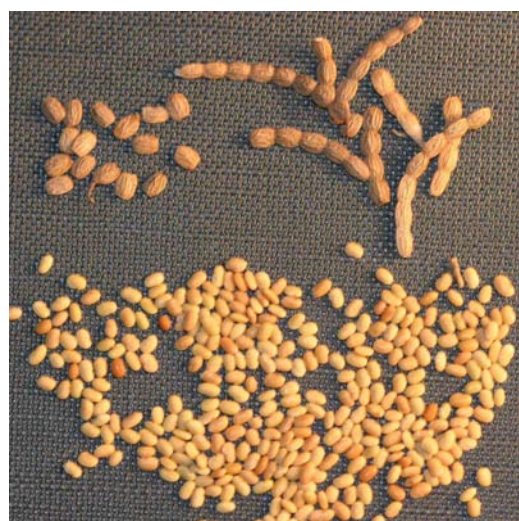


Figure 2. French serradella pods and seed. Photo courtesy Department of Agriculture and Food Western Australia – Pasture Science Group

Establishment and management

Sowing

Paddocks in which French serradella will be sown should be managed in preceding years to minimise weed and insect burdens. (This strategy is not specific to French serradella and should be used when considering sowing any pasture species.) French serradella can be sown into a conventional seed bed or direct drilled for good establishment. It may also be surface broadcast, although population density may be lower than that achieved by other methods.

French serradella may be sown as naked dehulled seed or in pod segments. If sowing as naked seed in a mixture with other annual legumes and grasses, a seeding rate of 2–4 kg/ha is recommended. If sown alone for fodder conservation purposes, a rate of up to 8–10 kg/ha can be used. Seed should not be sown deeper than 10 mm.

If sown as pod segments, hard seed breakdown will be delayed and germination in the first year poor. For this reason it is best to sow pod segments under winter crops. By doing this the seed pod will soften and French serradella will germinate in the following autumn. Sowing pod segments usually gives more variable results than sowing naked seed. For this reason rates of 10 kg of pod/ha or more is suggested to give an adequate density in the pasture.

The sowing rate of naked and un-dehulled seed can be doubled or trebled where seed is harvested on-farm for re-sowing and seed costs are much lower. Higher seeding rates are desirable to increase early winter feed or where weed competition is a problem.

Inoculum

French serradella requires Group S rhizobium (WSM 471) for successful nodulation and this should be applied to seeds or pods.

Fertiliser

Adequate phosphorus (P) is required to optimise growth of legumes. At least 10 kg P/ha should be used when sowing French serradella. Added sulfur (S) and trace elements such as molybdenum (Mo) may be required in some areas. Consult your local agronomist for further information.

Grazing

Care should be taken to avoid grazing French serradella too heavily during flowering and seed set in the first year of sowing. This will allow French serradella to set large amounts of seed from which to regenerate in subsequent years.

Following the establishment year, pastures containing French serradella may be grazed at moderate grazing pressure through the flowering and seed set period without adversely affecting persistence. If the population of French serradella in a pasture appears to be declining, resting the pasture through the flowering and seed-set period will allow soil seed bank reserves to increase and improve density in the following year.

To ensure good regeneration, French serradella residues should be grazed in late summer and early autumn.

If French serradella is intended for use as a seed or fodder conservation crop, it should only be lightly grazed up until mid to late winter in low rainfall areas and late winter in higher rainfall areas, to allow sufficient recovery time for high yields to be achieved.

Hard seed

Cadiz has low levels of hard seed (10% at maturity, falling to 5% by autumn) and is therefore best suited for use as short-term high productivity pastures. Grasslands Koha is also a soft-seeded variety. Both are highly susceptible to seedling loss associated with false breaks to the season.

Erica and Margurita have approximately 85% hard seed at maturity which declines to approximately 50% by autumn. This level of hard seed allows Erica and Margurita to better cope with more variable environmental conditions.

The superior regeneration of the hard-seeded varieties Erica and Margurita^{db} (and the hard-seeded sub clover variety Dalkeith) compared to the soft-seeded variety Cadiz following a false break in the season in January is shown in Figure 3.

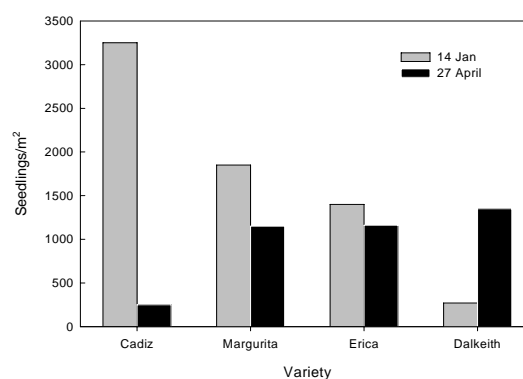


Figure 3. Superior regeneration of the hard-seeded varieties Margurita and Erica and the sub clover Dalkeith in autumn compared to the soft-seeded Cadiz following a false break in January.

Pests and diseases

French serradella is moderately tolerant of redlegged earth mite (*Halotydeus destructor*) and tolerant of blue-green aphid (*Acyrtosiphon kondoi*) and cowpea aphid (*Aphis craccivora*). However new sowings should be monitored for signs of damage and control measures taken if necessary.

French serradella is moderately susceptible to lucerne flea (*Sminthurus viridis*), so monitor pastures and control if necessary.

French serradella is susceptible to attack by native bud worm (*Helicoverpa punctigera*). This pest can cause a severe decline in seed production as it attacks seed pods. Seed crops and newly sown pastures should be closely monitored for signs of this pest from the beginning of pod fill until senescence, with control measures undertaken if necessary.

French serradella may be affected by collar and root rot, but it is generally regarded as being more tolerant than most annual clovers.

Seed production

French serradella is an aerial seeding legume and pods can be harvested using a conventional cereal header. This makes it relatively cheap for farmers to produce seed on farm. Harvested pods can then be re-sown.

However, to produce naked seed, pods must be passed through a dehuller. French serradella is easier to dehull than yellow serradella.

Seed yields of 400–900 kg/ha have been measured in small plot studies at Wagga Wagga, Merriwagga and Moombooldool in southern NSW.

Seed harvested on-farm should always be tested for germination prior to sowing, as harvesting techniques, seasonal conditions and storage can influence the level of soft germinable seed.

Herbage production

When grown as a regenerating pasture, French serradella is capable of moderate levels of production (Table 1).

French serradella may also be used as a specialist forage or fodder conservation crop. It has proved to be very highly productive in this role at many sites in NSW (Table 2).

Table 1. Herbage production (t DM/ha) over three years of three French serradella varieties and Dalkeith subterranean clover at a site near Moombooldool in southern NSW.

	Year 1	Year 2	Year 3
Erica	9.5	3.8	1.8
Margurita	6.1	3.7	1.3
Cadiz	4.0	0.6	0
Dalkeith	2.4	6.0	0.1

Herbage quality

Herbage produced by French serradella can be of very high quality providing it is harvested at the correct time. French serradella rapidly loses quality from the commencement of flowering through until maturity. Figure 4 shows the results of an experiment at Cootamundra in southern NSW where French serradella was sown as a one-year fodder conservation crop. The quantity of herbage on offer and its quality was assayed on five occasions through the spring and early summer period.

The results show that optimum herbage quality was recorded early in spring (11 October), prior to the commencement of flowering. Delaying harvest by six weeks (22 November) greatly increased the quantity of herbage available for fodder conservation, but quality, particularly digestibility, had already declined considerably. Producers need to consider not only the quantity of herbage available, but also its quality in deciding when to conserve fodder, as delaying harvest for too long to obtain a higher herbage yield will adversely affect quality and the potential animal production that can be achieved from conserved fodder.

Figure 4. Herbage production (A), digestibility (B), crude protein (C), and metabolisable energy (D) of French serradella in uncut swards measured on five occasions in spring 2005 at Cootamundra NSW.

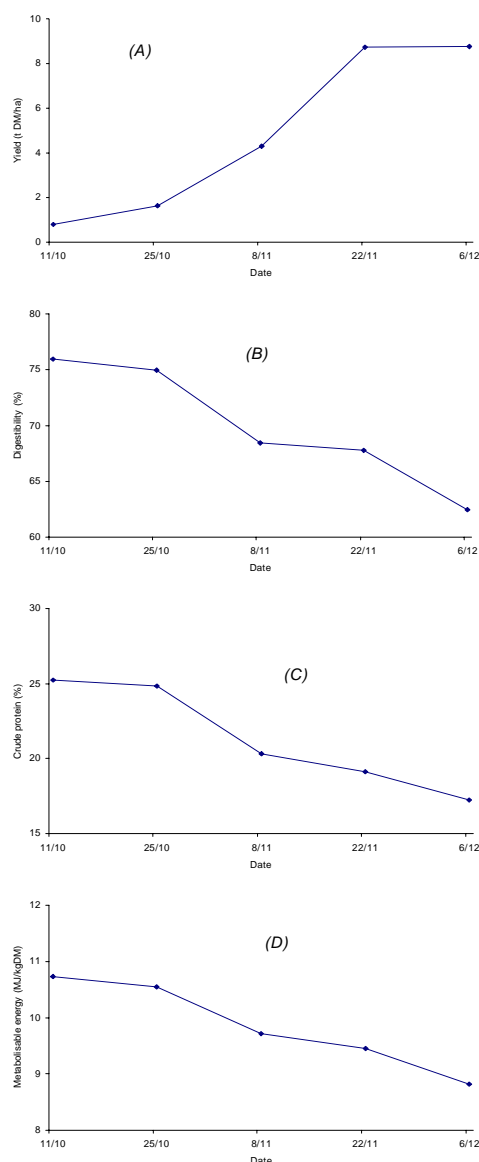


Table 2. Herbage production (t DM/ha) of several annual pasture legumes sown as a one year fodder conservation crop at various locations in NSW.

	Binalong	Harden	Berridale	Holbrook	Tamworth	Curban	Moree	Moree
Average annual rainfall (mm)	625	600	450	600	675	550	600	600
pH (CaCl ₂)	4.8	5.6	4.8	4.2	6.0	5.1	5.6	5.6
Exchangeable aluminum (%)	15	0	5	5	0	0	0	0
Soil type	Sandy loam	Red earth	Sandy loam	Loam	Medium brown clay	Sandy loam	Red clay loam	Black earth
Location ¹	sNSW	sNSW	sNSW	sNSW	nNSW	nNSW	nNSW	nNSW
	Herbage production (t/ha)							
Cadiz [®] French serradella	15.3	11.2		1.4	6.1	6.2	6.7	6.4
Erica [®] French serradella	15.3	9.3	3.0	6.2	6.3			
Margurita [®] French serradella	16.0	10.4		6.4	6.4			
Mauro [®] biserrula	13.7	7.1	2.3		5.8			
Paradana balansa clover	10.8	7.7	2.2					
Bolta [®] balansa clover	10.8	8.3		10.4				
Goulburn [®] sub clover	12.9	6.5	0.70	7.1				
Leura [®] sub clover	16.5	6.8	2.1	7.9				
Clare sub clover	16.0	7.9	–		5.6	7.5	5.9	7.0
Zulu arrowleaf clover	16.0	15.2	4.0	16.4	8.2	2.8	12.6	13.7

¹ Refers to southern or northern NSW

Acknowledgements

Margurita and Erica serradella were developed by the National Annual Pasture Legume Improvement Program (NAPLIP). Information on these cultivars was sourced in part from a report prepared by Brad Nutt of the Western Australian Department of Agriculture and Food (WADAF).

The authors thank Craig Rodham, Gabrielle Dyce and Brett Wilson for the maintenance and management of field sites associated with data presented in this Primefact.

Warnings

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders are possible. Management may need to be modified to minimise risk. Consult your veterinarian or advisor when planning pasture improvement.

Legislation covering conservation of native vegetation may regulate some pasture improvement practices where existing pasture

contains native species. Inquire through your office of the Department of Natural Resources for further information.

© State of New South Wales through NSW Department of Primary Industries 2008. You may copy, distribute and otherwise freely deal with this publication for any purpose, provided that you attribute NSW Department of Primary Industries as the owner.

ISSN 1832-6668

Replaces Agnote DPI 485

Check for updates of this Primefact at:
www.dpi.nsw.gov.au/primefacts

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (August 2008). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent adviser.

Job number 7893