Register of Australian Herbage Plant Cultivars

B. Legumes
1. Clover
Trifolium michelianum Savi (balansa clover) cv. Frontier

Reg. No. B-1j-3

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Originators: A. D. Craig[A], G. A. Sandral[B], B. S. Dear[B], R. A. Latta[C], P. M. Evans[D], and N. L. Hill[E]

[A] South Australian Research and Development Institute, Struan Research Centre, Naracoorte, SA 5271, Australia.
[B] NSW Agriculture, Agricultural Institute, Wagga Wagga, NSW 2650, Australia.
[C] Agriculture Western Australia, Great Southern Agricultural Research Institute, Katanning, WA 6317, Australia.
[D] Department of Natural Resources and Environment, Pastoral and Veterinary Institute, Hamilton, Vic. 3300, Australia.
[E] Department of Primary Industries and Fisheries, Berrimah Farm, Darwin, NT 0801, Australia.

Registrar: W. M. Kelman

CSIRO Plant Industry, GPO Box 1600, Canberra, ACT 2601, Australia.

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Origin

Frontier is a composite cultivar comprised of 20 individual lines. Each line was developed through single plant selection from within the parent line, Paradana. The basis for selection was early flowering and improved plant vigour. Selections were made by A. D. Craig, South Australian Research and Development Institute (SARDI).

Selection commenced in 1989 when 32 early flowering plants were identified in Paradana (17 plants) and line WA 426B (15 plants). WA 426B is an early flowering selection made from within Paradana by R. Snowball, Australian Trifolium Genetic Resource Centre in Perth. Seed was collected from the 1989 selections and re-sown in rows in 1990 to confirm flowering dates and for seed increase. In 1991, seed from the 15 earliest flowering lines was re-sown, with 23 new selections being made on the basis of early maturity. In addition, in 1991 another 20 early flowering plants were selected from newly sown Paradana pastures. In 1992, seed of each of the 1991 selections (43) was sown in rows and 50 plants were selected on the basis of early flowering and plant vigour. This process was repeated in 1993. Fifty-five single plant selections were made in 1993.

The 1993 selections were grown at Pinnaroo, South Australia, in 1995 and assessed for maturity and dry matter yield. Thirty lines were retained and entered into a 3 year national evaluation. Upon completion, 20 of the 30 lines under test were selected and combined in equal quantities to form Frontier.

The field evaluation of Frontier was conducted under the auspices of the National Annual Pasture Legume Improvement Program (NAPLIP). Screening for pest and disease resistance was conducted by P. G. H. Nichols (Agriculture Western Australia) and S. S. Robinson (SARDI).

Frontier has been approved for registration by SARDI. Breeders seed will be maintained by SARDI. Seed will be certified in States accredited to operate OECD Seed Certification Schemes. Frontier has been submitted for protection under Plant Breeders Rights legislation.

Morphological description

Frontier is an annual, herbaceous, aerial-seeding legume. Habit prostrate as a single plant, becoming semi-erect in dense swards. Stems predominantly green with occasional red coloration, glabrous, hollow when elongated. Leaves trifoliate, alternate, mid-green, glabrous. Leaflets mainly obovate-elliptical-oval. Margins weakly-strongly serrate. Apices truncate-retuse. Leaf markers vary in colour, position and degrees of distinctiveness. Leaflets may be plain leaved or display white, silver, dark brown and/or pink markers; incidence of anthocyanin pigmentation very low. Petioles light green, glabrous, hollow when elongated. Stipules entire, lanceolate-sagittate, green-red in colour.

Inflorescence umbellate, 20–25 mm in diameter. Peduncles predominantly green with occasional red coloration, glabrous. Pedicels bracteate, green-red in colour. Number of florets variable, typically 35–45 per inflorescence. Corolla white-pink, standard terminating in a faint pink tip. Pink flowers typically in the outer whorl of the inflorescence. Pink coloration strengthens with maturity before becoming light-brown in the mature head. Calyx green, 5 mm long, 5 lobes, uneven in length, 2–3 times longer than the tube. Seeds mainly 3–4/pod. Seed colour variable, including olive green, yellow, light brown, dark brown to black; about 1 200 000 seeds/kg; about 97% hardseeded at maturity, falling to about 50% by mid-April. Seed shatters readily from the head.

In many respects Frontier resembles the later-maturing cultivars, Paradana (Anon. 1990) and Bolta (Craig 1998), although the 3 cultivars are readily distinguishable on the basis of maturity. In South Australia, Frontier flowers 2–3 weeks earlier than Paradana and 4 weeks earlier than Bolta. Frontier

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may also be distinguished from Paradana and Bolta on the basis of its leaf markers. Frontier contains a relatively low frequency of plants with a whitish/silver marker in the centre of the leaflet. This leaf mark occurs at a much higher frequency (about 11-fold) in Paradana and is almost non-existent in Bolta. In addition, Frontier displays a higher proportion of vivid pink leaf marks than either Paradana or Bolta. Frontier's leaflet margins are more weakly serrated than those of Paradana. Weights of 100 seeds of Frontier, Paradana and Bolta are 9.54×10^{-2}, 9.06×10^{-2} and 1.04×10^{-1} g respectively.

Agronomic characters

Frontier has been developed for temperate Australia as a nitrogen source for crops and as a forage plant for livestock. It is suitable for standing feed, hay production or as a green manure crop. Frontier has been developed for areas receiving 350–500 mm annual rainfall (high winter incidence). Number of days to full flower is 117 (sown early June 1996, Lameroo South Australia).

Frontier is adapted to a wide range of soil types. It performs best on soils of moderate-good fertility and has grown poorly on deep acid sands where fertility is low. Frontier is known to tolerate a pH (H_2O) range of 5.4–9.0, although it performs best where pH is below 8.3. It is well adapted to waterlogging and possesses moderate salinity tolerance, similar to Paradana.

Frontier nodulates effectively with a wide range of commercial inoculants, although commercial Group CS (WSM 409) is recommended.

Early–mid season (June–October) herbage production of Frontier has, on occasions, been significantly higher than that of Paradana (49%) and Bolta (61%). Spring herbage yields of up to 3655 kg/ha have been recorded in regenerating Frontier stands. Frontier contains low levels of formononetin (mean 0.02% dry matter), while genistein and biochanin A were not detectable.

Frontier is susceptible to redlegged earth mite (*Halotydeus destructor* Tucker) and lucerne flea (*Sminthurus viridis* L.). Glasshouse screening studies rate Frontier's susceptibility to redlegged earth mite as similar to Paradana. Glasshouse studies have also shown Frontier to be susceptible to pasture aphids (spotted alfalfa, blue-green and cow-pea), although significant damage has not been observed in the field. Frontier is tolerant of clover scorch [*Kabatiella caulivora* Kirchn. (Karak)] but is susceptible to *Pythium* spp. at the seedling stage under suitable conditions.

Frontier has produced higher seed yields than Paradana and Bolta in 350–465 mm rainfall areas, with yields of up to 1221 kg/ha having been recorded. Frontier has consistently produced higher seed and herbage yields than Nitro Plus and Prolific Persian clover. Seedling regeneration of Frontier has usually equalled or exceeded that of Paradana.

Frontier has persisted under grazing for at least 3 years. Regeneration of Frontier is significantly enhanced when residual dry matter is removed from the sward over summer.

Acknowledgments

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References

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