

# Register of Australian Herbage Plant Cultivars

## B. Legumes

### 8. Lucerne

#### a. *Medicago sativa* L. (lucerne)

##### cv. Trifecta

Reg. No. B-8a-17

Registered April 1983

*Published in the Journal of the Australian Institute of Agricultural Science 49(4), 247-9 (1983).*

#### Origin

Trifecta was bred by the CSIRO Division of Tropical Crops and Pastures and the Queensland Department of Primary Industries in a collaborative program. The breeders were R.J. Clements, J.W. Tuner, J.A.G. Irwin, P.W. Langdon, R.A. Bray, A.C. Brooks and C.J. Thomson.

About 67% of the background genotype of Trifecta was derived from two Hunter River lines, one selected for resistance to root rot (*Phytophthora megasperma* Drechs. f. sp. *medicaginis* Kuan et Erwin) and the other from crown rot (*Colletotrichum trifolii* Bain et Essary) (1, 6), 25% from CUF 101 (which taces to UC Salton, a broadly-based non-dormant cultivar) (10), 2% from a *Phytophthora* resistant line code-named C3 derived from the cultivars Siro Peruvian, Lahontan and UC76 (16), 1% from persistent, vigorous, spreading plants derived from crosses between a Libyan line and wild accessions from Spain (9), 2% from plants persisting in a Hunter River stand devastated by *Rhizoctonia solani* Kuhn (11), 2% from a Siro Peruvian line selected for resistance to *Colletotrichum trifolii* (6), and 1% from the parents of the creeping rooted cultivar Walkabout (15).

To produce Trifecta (3), aphid-resistant selections from CUF 101 were crossed with the *Phytophthora* resistant Hunter River line and with the other minor sources of germplasm. Progeny were screened for resistance to *Phytophthora* and to two aphids, *Therioaphis trifolii* (Monell) f. *maculata* (the spotted lucerne aphid) and *Acyrtosiphon kondoi* Shinji (the blue-green aphid). Selected progeny were then crossed with the *Colletotrichum* resistant Hunter River line to produce a base population. Two complete cycles of selection and recombination were conducted within this population to intensify the levels of resistance to both diseases and both aphids. All selection was carried out in glasshouses and controlled environments. Throughout the breeding program, inbreeding depression was minimised by using large numbers of parents (never less than 100 parents in each crossing cycle), by using within-family selection, and by avoiding intense selection pressures in the early generations. Trifecta is based on about 400 multiple resistant plants from the final cycle of selection (3).

Submitted for registration jointly by CSIRO Division of Tropical Crops and Pastures and the Queensland Department of Primary Industries. CSIRO Division of Tropical Crops and Pastures will maintain breeders' seed. Recommended for registration by the Queensland Herbage Plant Liaison Committee. Registered April, 1983.

#### Morphological description

Trifecta is intermediate in appearance between Hunter River and CUF 101 (3). Its growth habit is slightly more upright than Hunter River, its stems are slightly coarser and taller, and its leaflets are larger. Crowns are densely branched.

#### Agronomic characters

Trifecta was developed to fill a widely-recognised need (2) for a more persistent cultivar to replace Hunter River in Queensland subtropics. Diseases (5) and aphids (12, 13) are known to reduce stand life in southern Queensland.

Trifecta can be distinguished from previously registered cultivars by its spectrum of resistance to diseases and insects. It has *Phytophthora* resistance equal to that of the *Phytophthora* resistant parent line selected from Hunter River, greatly superior that of commercial Hunter River, and superior to that of CUF 101 and Siriver (7). About two-thirds of the plants are resistant. The anthracnose (*Colletotrichum*) resistance of Trifecta is equal to that of the anthracnose resistant parent line selected

from Hunter River, and greatly superior to that of commercial Hunter River and CUF 101, but lower than that of Arc (7). About half of the plants are resistant. Resistance of Trifecta to the spotted lucerne aphid is similar to, or slightly less than, that of CUF 101 and Siriver, and greatly superior to that of Hunter River (17); in glasshouse trials 43-92% of Trifecta plants were resistant (cf. 38-97% of CUF 101 plants and 46-100% of Siriver plants). Both tolerance to blue-green aphid and resistance to the pea aphid (*Acyrtosiphon pisum* Harris) are slightly lower than those of Siriver and CUF 101 but greatly superior to those of Hunter River (17).

In Queensland, Trifecta is classed as a winter active cultivar intermediate in dormancy between its main parents Hunter River (semi-dormant) and CUF 101 (highly winter-active) (3, 4). However, in South Australia Trifecta is only slightly more winter-active than Hunter River (8). Trifecta is a high yielding cultivar, particularly where its disease resistance gives it an advantage (3, 14). In irrigated trials near Gatton where *Phytophthora* infestation was severe, Trifecta outyielded CUF 101 by 16-19%, Siriver by 24-66% and Hunter River by 180-230% during the first year of production (3, 14) and significantly outyielded all of the other 25 cultivars tested. At Biloela where *Phytophthora* levels were much lower, only four highly winter-active cultivars out of the 28 sown significantly outyielded Trifecta in an irrigated trial during the first year of production (4). Plant survival of Trifecta was superior to that of most other cultivars at Gatton and Biloela. Trifecta also has shown satisfactory performance at several non-irrigated sites on the Darling Downs and adjacent areas, under cutting and controlled grazing (11).

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