

Register of Australian Herbage Plant Cultivars

B. Legumes

9. Annual Medics

g. *Medicago murex* Willd. (murex medic)

cv. Zodiac

Reg. No. B-9g-1

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Origin

Collected near Luogosanto in N.W. Sardinia by C.M. Francis and D.J. Gillespie in June 1977 on granitic sandy soil of pH 6.0 (CSIRO soil test kit), altitude 300 m, rainfall approximately 800 m. The site was lightly grazed and associated legume species included *Trifolium subterraneum*, *Ornithopus compressus*, *Lupinus angustifolius*, *Medicago polymorpha*, and *Vicia* spp. (Francis and Gillespie 1981). Selected and tested under the collectors' code number CD 64.11.1. Originator: D.J. Gillespie, Department of Agriculture, Baron-Hay Court, South Perth.

Initially selected for its excellent vigour, prostrate growth habit, and lack of pod spininess. Widely tested in Western Australia since 1982 and interstate since 1984.

Submitted by the Western Australian Department of Agriculture and recommended for registration by the Western Australian Herbage Plant Liaison Committee. The Western Australian Department of Agriculture will maintain breeders' seed. Registered January 1988.

Morphological characters

Medicago murex is an annual herb, prostrate to semi-erect, with branches to 90 cm long. All vegetative parts are glabrous except for a few simple hairs along the midrib on the underside of the leaflets. Leaflets dark green with no marks or with pale green/white flecks on the upper leaf surface, their frequency varying with the variety. A brown basal mark in the form of an inverted 'V' may also be present. Flecks and basal mark inconspicuous or absent with warm temperatures. Purple anthocyanin flecking may also occur on the leaf margins at low temperatures in winter. Leaflets 10-20 mm long by 10-15 mm wide, obcordate in winter tending to obovate in spring. Veins obviously lighter coloured than the rest of the leaflet, each ending in a fine tooth, the midrib ending in a larger terminal tooth. Margin of leaflet slightly serrate in the upper third. Petioles and stems pale green except when exposed to the sun at low temperatures when a strong purple/red anthocyanin flush develops. This flush can also colour the midrib. Stipules deeply incised forming long teeth. Peduncle varies in length from half to twice the length of subtending petiole. Flower number per peduncle 1.0-6.0. Flowers pale yellow, standard about 4 mm long, wings slightly longer than the keel, corolla about twice length of calyx. Calyx teeth equal in length to calyx tube and tube sparsely hairy. Young pod contracts within the calyx then protrudes sideways through the calyx teeth. Young fruit is glabrous. Mature pods ovoid to spherical, grey brown to black, hard walled, and spineless or with variable length spines up to 2 mm. Coils 5-9 per pod, tightly adpressed and coiling anticlockwise. Face of coil with radial curved veins running into a veinless outer margin at least a third of the radius of the pod and appearing darker in colour than the centre. The dorsal suture may be flanked by 2 narrow furrows but in some lines these furrows are less obvious or are absent. Seeds yellow brown, 5-8 per pod, bow shaped, 3.5-5.5 mg/seed. Chromosome number $2n = 14$ or $2n = 16$. The chromosome number of Zodiac is $2n = 16$.

The $2n = 16$ form is prostrate. Leaflets have pale green/white flecks and varying degrees of purple anthocyanin flecking, except at warm temperatures. Brown basal mark present in some lines. Flower number per peduncle usually less than 3.0 (1.0-3.0). Furrows flanking the dorsal suture are inconspicuous or absent especially in mature pods.

Zodiac is prostrate in winter but less so in spring. Leaflets have a moderate density of pale green/white flecks on upper surface and a varying degree of purple flecking on the leaf margins in winter. Flecks are inconspicuous or absent with warm spring temperatures. Mostly 2-flowered with 1-2 pods per peduncle. Peduncle length about half the length of subtending petiole. Pods 6-9 mm, with approximately 18 slightly curved spines per coil, each 0.5-1.0 mm long but appearing only as tubercles

on some pods. Proportion of tubercled pods varies with environmental conditions. Coils 6-7 per pod. Seeds 4.5 mg (220 000/kg), 5-7 per pod.

Agronomic characters

Zodiac has midseason maturity, flowering 114-118 days after early May sowing at Perth and up to 125 days after sowing in cooler southern inland areas of Western Australia. This is 7-11 days later than *M. truncatula* cv. Jemalong. Winter growth habit is more prostrate than Australian medics such as Jemalong and *M. polymorpha* cv. Circle Valley, and it quickly forms a dense sward. Zodiac has been observed at a number of sites over several years to remain green in late spring for 3-4 weeks longer than *Trifolium subterraneum* cultivars of similar flowering date.

Since 1982, Zodiac has been included in over 70 assessments of herbage yield, seed yield and of regeneration density in field trails in Western Australia, many of which were grazed by sheep for most of the year. It has been the best *M. murex* line amongst nearly 200 tested (Gillespie 1986). Comparisons with commercial cultivars of other species have been made in a number of experiments and the results are summarised in Table 8.

Table 8 Comparisons of Zodiac murex medic with other annual legumes

Species and cultivar	Number of Comparisons	Mean Yield (kg/ha)		Plant regeneration ^A (No./m ²)
		Herbage	Seed	
<i>M. murex</i> cv. Zodiac	-	3550	325	405
<i>M. tornata</i> cv. Tornafield	6	1788	292	66
<i>M. polymorpha</i> cv. Circle Valley	7	2653	443	494
<i>T. subterraneum</i> cv. Seaton Park	7	2961	396	463
<i>T. subterraneum</i> cv. Juneec	7	3182	375	579

^Amean regeneration after a cropping year

In Western Australia, Zodiac is likely to be recommended for sowing in areas with more than 450 mm rainfall where cropping is part of the farming system and on most soil types of pH 4.8 or greater (1:5 in 0.01 mol/L CaCl₂), with the exception of deep sands and severely waterlogged soils.

In New South Wales, in experiments sown at Temora in 1985 and 1986 on a red brown earth, Zodiac set more seed and regenerated better than other *M. murex* lines, and was markedly superior to Jemalong, setting 72% more seed in the first year, and more than doubling the regeneration density of Jemalong in the second year (Dear and Jenkins 1987). A Kybybolite, South Australia, Zodiac was the best seed yielding murex line amongst 26 tested in 1985, setting 1356 kg/ha of seed compared to Trikkala with 934 kg/ha (A.D. Craig, unpubl. data). In 1985 at Turretfield, South Australia, Zodiac was equal highest murex line amongst 8 tested (D. Little, unpubl. data). Variable results have been obtained from Nhill and Wycheproof in Victoria where Zodiac was compared with other medics and subterranean clover in 1985 and 1986. At Nhill, Zodiac performed similarly to Circle Valley and *M. truncatula* cv. Paraggio in the second year and also for regeneration in 1987 (third year). Other medics have been inferior. At Wycheproof seed production of Zodiac was poor in the first year and, despite improved performance in the second year, it was still inferior to Paraggio, although similar to Circle Valley (R.Latta, unpubl. data).

Hardseed level in laboratory tests (6 months at 15/60°C), has averaged 57% hard (6 tests) compared with Circle Valley 66% hard. Field tests at Temora in New South Wales found Zodiac to have 48% hardseed after summer (determined by measuring seed remaining the following spring) compared with *T. subterraneum* cv. Seaton Park (18%), Paraggio (40%) and Jemalong (69%) (B.S. Dear, pers. comm.).

Coumestrol levels of leaves, stems and pods have been tested several times and only trace amounts have been recorded (B. Tan, pers. comm.).

Zodiac, in combination with acid tolerant *Rhizobium meliloti* (such as WSM 419), is able to achieve satisfactory nodulation in second year stands on soils far more acid than can any other commercial medic species (Howieson 1986). Well nodulated stands on soils as acid as pH 4.8 (1:5 in 0.01 mol/L CaCl₂) are common and up to 90% of plants nodulated in the second year at pH 4.35 has been recorded (Gillespie 1987).

Pods of Zodiac are unlikely to adhere to wool in large quantities because the spines are short. Pod spininess rating is 5 compared with 10 for Jemalong (E.J. Crawford, pers. comm.).

Zodiac is susceptible to spotted alfalfa aphid (*Therioaphis trifolii* (Monell) f. *maculata*). But has some resistance to both blue-green aphid (*Acyrtosiphon kondoi* Shinji) and pea aphid (*Acyrtosiphon pisum* Harris). These levels of resistance are similar to that of *M. littoralis* cv. Harbinger. (A.W.H. Lake, unpubl. data).

Zodiac also has some seedling resistance to red-legged earth mite (*Halotydeus destructor* Tucker), scoring 4.3 on an increasing damage scale of 1-10, compared with 5.0 for Circle Valley burr medic, and 5.7, 6.0 and 6.3, respectively, for the barrel medic cvv. Cyprus, Paraggio and Jemalong.

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