Register of Australian Herbage Plant Cultivars

B. Legumes
23. Clitoria
(a) *Clitoria ternatea* L. (butterfly pea) cv. Milgarra

Reg. No. B-23a-1

Registered 20 November 1991

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Released by Queensland Department of Primary Industries

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Origin

Milgarra is a composite line developed by combining selected introduced and naturalized lines of *Clitoria ternatea* over 3 generations at Walkamin Research Station, following the classification and field evaluation of introductions in North Queensland.

The dominant introductions in the composite were CPI 47187 and Q7006, and Australian naturalized lines Q17401, Q24717, Q24718 and Q24719. Other introductions included as a minor component were: Q9167, CPI 20733, 28110, 30001, 48337, 49963, 49706, 52394, 52395, 52396, 52397, 52398 and 61151, and a naturalized line, Q24720. This composite was grown for 3 seasons to produce Milgarra, which has been tested as Q17476.

Butterfly pea (or blue or kordofan pea) is widely distributed throughout the humid, lowland tropics of Africa, Asia and Central America. In Africa it grows in grasslands, often on seasonally-waterlogged black clays and in old cutivations. In Sudan it is grown for fodder or grazing and in Kenya it is grown in a mixture with *Chloris gayana* (Bogdan 1977). Butterfly pea is recognized as being adapted to clay soils (Blunt and Chapman 1978; Hall 1985; Parberry 1967) and has been tested as a forage and cover crop, but never developed as a pasture cultivar.

Milgarra was submitted by the Queensland Department of Primary Industries for release as a public cultivar, and was recommended for registration by the Queensland Herbage Plant Liaison Committee in August 1990. Breeders' seed will be maintained by the Queensland Department of Primary Industries.

Morphological description

Milgarra is a vigorous, strongly persistent, herbaceous, sparsely pubescent, perennial legume with fine twining stems, suberect at base, 0.5–3 m long. Leaves pinnate with 5 or 7 leaflets; petioles 1.5–3 cm long; stipules persistent, narrowly triangular, 1–6 mm long, subulate, prominently 3-nerved; rachis 1–7 cm long; stipels filiform, to 2 mm long; leaflets elliptic, ovate or nearly orbicular, 1.5–5 cm long, 0.3–3 cm wide, with apex acute or rounded, often notched, and base cuneate or rounded, both surfaces sparsely appressed pubescent. Flowers axillary, single or paired; pedicles 4–9 mm long twisted to 180º so that the standard is inverted. Bracteoles persistent, broadly ovate or rounded, 4–12 mm long. Calyx 1.7–2.2 cm long with a few fine hairs; tube campanulate, 0.8–1.2 cm long; lobes triangular or oblong, 0.7–1 cm long, acute or acuminate. Standard obovate, funnel-shaped, 2–5.5 cm long, 2–4 cm wide, notched or rounded at apex, blue with a pale yellow base, or entirely white, a few fine hairs at apex. Pods linear-oblong, flattened, 4–13 cm long, 0.8–1.2 cm wide, with margins thickened, and style persistent, sparsely pubescent when mature, pale brown, dehiscent when dry. Seeds 8–11, oblong or oblong-reniform, somewhat flattened, 4.5–7 mm long, 3–4 mm wide, olive brown to almost black, shiny, often mottled, minutely pitted (Mrs A. E. Holland pers. comm.). Morphology can vary with different growing conditions. Milgarra, which has no significant distinguishing morphological characters, is normally towards the upper end of the size ranges of descriptions in the taxonomic literature (Bogdan 1977; Verdcourt 1979). There are approximately 23 000 seeds per kg.

Milgarra is self-pollinating, although some out-crossing occurs since segregating genotypes have been identified within natural populations. Emasculation is easily performed with tweezers to make crosses. The legume is a diploid, chromosome number $2n = 16$. Homozygous blue and white and heterozygous blue genotypes have been identified (Crowder 1974).

In Australia, the morphological and agronomic variation of 58 accessions of *C. ternatea* has been described (Reid and Sinclair 1980) and the adaptation and agronomy of introductions in northern Australia have been reported (Hall 1985; Hall *et al*. 1987).

Agronomic characters

Butterfly pea is adapted to soil textures from loams to heavy clays. It has been the most productive and persistent legume on cracking clay soils in the seasonally dry tropics of north Queensland. Some examples are (i) persisting 18 years on a grey cracking clay with a neutral to slightly alkaline pH and 5–8 µg/g phosphorus, when sown with 125 kg/ha superphosphate into a *Dichanthium-Eulalia-Astrebla* grassland near Normanton; (ii) persisting over 10 years under grazing in a buffel pasture on cleared brigalow soil at Collinsville; (iii) establishing with Silk sorghum and purple pigeon grass after sowing at low seeding rates (<1 kg/ha) in a grassland following blade ploughing black clay at Collinsville; the pasture has persisted under grazing for 2 years; (iv) spreading on fertile loamy frontage soils on Walkers Creek (Normanton) and Lynd River (Mt Surprise); (v) stabilizing clay soil banks of dams near Normanton; (vi) persisting 3 years with heavy dry season grazing on a euchrozem soil near Mt Surprise; and (vii) persisting on cracking grey clay in both grader grass

invaded areas and in *Astrebla-Dichanthium* grassland near Chillagoe. In the Northern Territory, *C. ternatea* has performed well on several soil types other than clays, including lithosols, yellow earths, sandy red earths and loamy red earths (Cameron and McCosker 1986; Cameron *et al*. 1984). Milgarra is not suited to arid environments, infertile sandy soils or areas subject to frequent frosts, waterlogging or flooding.

Most growth of perennial plants occurs from the growing tips of the main stems and axillary branches, with few new crown shoots developing. This explains poor survival under frequent cutting or heavy grazing during the growing season. Butterfly pea persists under management of light wet season grazing and heavy grazing each dry season. Ungrazed stems provide growing points for early summer growth. New growth and flowering occurs in spring if there is sub-soil moisture. There are no local field data on animal production, but evidence of palatability, high digestibility and high nutrient concentrations suggest it will be beneficial to grazing cattle. Dry season leaf fall will restrict the major grazing benefits to the late wet season–early dry season period. Extension of the period of liveweight gain into the dry season is expected. Cattle graze fallen leaf, and the associated grasses are heavily utilized. Perennial grass plants have declined in dense legume swards. Pen feeding trials with sheep have shown butterfly pea, when added to a base diet of grass (*Astrebla* sp.), will increase intake and liveweight (A. C. Schlink pers. comm.).

On infertile grey clay, butterfly pea dry matter yields have ranged from 330 kg/ha in undisturbed native pasture in the establishment season over a low rainfall summer, to 4000 kg/ha in an established sward over a good wet season. Both yields and seedling populations are increased in the first year by sowing into cultivation, and superphosphate increases production. On a euchrozem soil near Mt Surprise, Milgarra yielded 4200 kg DM/ha after 4 months growth and 7500 kg DM/ha (including 840 kg/ha of seed) after 6 months under rain-fed conditions. Nutrient concentrations in leaf only and whole plant tops respectively were: 3.05 and 1.49% N, 0.22 and 0.28% P, 0.22 and 0.13% S, and 14 and 20 µg/g Zn. At the same time (June), Milgarra grown on a grey clay at Normanton had concentrations of 2.22% N, 0.32% P, 0.20% S and 20 µg/g Zn in tops. Initial growth is fast, and in India 24 t/ha fresh material containing 3.3% N, 0.28% P, 0.8% Ca, 33.3% CF, and 34.7% NFE, and has been grown in 2 months. Digestibility of 74% has been reported with sheep (Bogdan 1977).

Flowers can develop in 4–6 weeks after sowing and they can appear throughout the year provided there are suitable temperatures and adequate soil moisture. A greater abundance of flowers form soon after the dry season in tropical regions. Pod maturity is irregular (Crowder 1974).

Fresh seeds have hard seed coats and do not germinate or imbibe water, but when stored for 6 months 15–20% germination can be obtained (Mullick and Chatterji 1967). Mechanical scarification, hot water, sulfuric acid and KOH will increase germination. Soaking in 100 mg/L solution of NaCN has also improved germination and early plant growth (Bogdan 1977). Mechanical scarification increased germination of 6-month-old Milgarra seed from 30% (61% hard) to 71% (16% hard). Tropical group M inoculum is effective, but seedlings establish and plants have grown well without it on heavy clay soils in north Queensland.

Mechanical seed production methods have been developed, based on treating the plant as a row-cropped annual. Yields of 700 kg/ha of direct-headed seed have been produced (J. M. Hopkinson pers. comm.). The irregular pod maturity affects the time of seed harvesting, as early pods shatter while flowers and green seed may be present. Powdery mildew (*Oidium* sp.), leafspot (*Cercospora* sp.) and anthracnose (*Colletotrichum* sp.) can occur, especially in a wet autumn. Lesions can become extensive on leaves and pods, but the plants continue to grow and produce viable seed. Leaf sucking insects, caterpillars and grasshoppers have caused slight damage.

Alternative uses of butterfly pea include: hay, cover crop, revegetation, garden ornamental, high quality oil, medicinal, and food coloring (by the relatively stable natural dye in the flowers).

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