

B. Legumes

9. Annual Medics

(a) *Medicago truncatula* Gaertn. (barrel medic) cv. Caliph

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Originators: A.W.H. Lake and staff.

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Origin

Caliph (Cyprus AR) was selected from a backcrossing program designed to produce a barrel medic with field performance very similar to the barrel medic cultivar, Cyprus, but with good resistance to blue green aphid (*Acyrtosiphon kondoi* Shinji, BGA). Cyprus and Caliph are both resistant to spotted alfalfa aphid (*Therioaphis trifolii* (Monell) f. *maculata*, SAA).

The need for a BGA resistant replacement for Cyprus was identified from field trial data in several states, but particularly as a result of the extensive work of R.R. Young and R.S. Wetherall in central and western NSW.

The backcrossing program used Cyprus as the recurrent parent, while the aphid resistance donor parent was itself a hybrid selection of complex origin. The ultimate source of the BGA resistance gene in this hybrid was the barrel medic SA1499, but 4 other lines contributed germplasm to the original donor selection. Seed of SA1499 was supplied and is maintained by the Australian Medicago Genetic Resource Centre. BGA resistant plants in each backcross generation were hybridised with Cyprus.

At the second backcross stage, about 20 F₂ plants with resistance to both SAA and BGA were selected. These were individually harvested and progeny tested for aphid resistance segregation. Three non-segregating lines were isolated, and these were then seed increased for further selection and testing.

Field testing of these lines was carried out in all mainland southern states of Australia against a range of medic cultivars and lines. Among these

were several other selections derived from Cyprus crosses and backcrosses. From these trials, Z-602 was found to have the best overall performance in areas which have traditionally grown Cyprus and was selected to constitute the cultivar Caliph.

The breeding of Caliph was part of the National Annual Medic Improvement Program (NAMIP). Major collaborators for trial and other work in the development of the cultivar included: J.H. Howie, R.J. Saunders and J. Crosby (South Australian Department of Agriculture), R.R. Young and R.S. Wetherall (New South Wales Agriculture), R. Latta (Victorian Department of Agriculture), and D.J. Gillespie, C. Revell and B. Nutt (Western Australian Department of Agriculture).

Caliph was submitted by the collaborators of the National Annual Medic Improvement Program through the South Australian Department of Agriculture and recommended for registration by the South Australian Herbage Plant Liaison Committee. Breeders' seed will be maintained by the South Australian Department of Agriculture. Protection for this cultivar under Plant Variety Rights legislation is being sought.

Morphological description

Caliph is morphologically very similar to Cyprus, its recurrent parent. The morphological description of Cyprus contained in the Register of Australian Herbage Plant Cultivars (Oram 1990) is thus also applicable to Caliph, except that Caliph does not have any plants with leaflets having a small yellow blotch as in Cyprus.

Agronomic characters

Caliph is also quite similar agronomically to Cyprus, except that only the former has resistance to BGA (the level of which is similar to that of the barrel medic cultivars Sephi *et al.*). In comparative glasshouse tests on 3-week-old seedlings infested with BGA, Cyprus plants rapidly developed damage symptoms such as stunting and distortion of developing leaflets.

After 2 weeks, some Cyprus plants had died, while all surviving Cyprus plants were severely damaged. In contrast, Caliph plants were virtually undamaged after the same period under BGA attack. During the subsequent 2-week period, the remaining Cyprus plants all died, and BGA numbers declined dramatically. Throughout the experiment, many Caliph plants had 1-2 BGA present (particularly immediately after nearby Cyprus plants died) but no large scale multiplication was evident, and these aphids were almost invariably found only in very close proximity to the shoot apex. In contrast, BGA multiplication on Cyprus plants was rapid, and aphids quickly spread across the whole plant.

Like Cyprus, Caliph is susceptible to a range of other insect pests such as cowpea aphid (CPA) (*Aphis craccivora* Koch), red-legged earthmite (*Halotydeus destructor* Tucker) and lucerne flea (*Sminthurus viridis* L.).

The flowering characteristics of Caliph are also similar to those of Cyprus. Comparative trials of several cultivars over several years showed that Caliph and Cyprus both flowered about 87-95 days after an early June germination or up to 7 days earlier than Parabinga and Harbinger AR and 2 weeks earlier than Paraggio and Jemalong. While these differences may fluctuate from year to year, there was a closely comparable pattern of flowering in Caliph and Cyprus; differences between these cultivars of 2-3 days in time to first flowering have been observed in some experiments, but these have been negated by differences of similar magnitude but reverse order in others.

The field performance of Caliph is also similar to that of Cyprus, except if BGA are prevalent, when Caliph shows significant superiority. For example, at a trial site near Jamestown, SA in 1989, the seed yield of Caliph was nearly double that of Cyprus. Although mostly only in low numbers, BGA were present at this site virtually throughout the growing season. An even greater disparity was obtained under infestation of both BGA and CPA in a 1990 trial near Merredin in

WA, where the seed yields of Cyprus and Caliph were 7 and 158 kg/ha, respectively (C. Revell, personal communication). In contrast, a trial at Mundoora, SA in the same year failed to reveal any significant difference between the herbage and seed yields of Caliph and Cyprus; BGA were not found at this site during the growing season.

In other major trials in Western Australia, South Australia and in western New South Wales in particular, the dry matter production, seed yield and regeneration plant density and production of Caliph was usually greater than that of Cyprus. Comparisons have also been made between Caliph, Parabinga and Paraggio. In general, Caliph is superior in both herbage and seed yield to Paraggio in most earlier districts, and is usually at least equal to and often better than Parabinga, except on very sandy soil types. This is a reflection of the good adaptability of Caliph's recurrent parent Cyprus to low rainfall, medium and heavy textured soil types, a trait which has been successfully retained in Caliph. Thus, Caliph is suitable for sowing in those areas where Cyprus has been recommended in the past.

Acknowledgements

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References

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