

Register of Australian Herbage Plant Cultivars

B. Legumes

1. Clover

(d) *Trifolium subterraneum* L. var. *subterraneum* (Katz. et Morley) Zohary and Heller (subterranean clover) cv. York

Reg. No. B-1d-32

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Origin

York was collected in Sardinia by C. M. Francis and D. J. Gillespie in June 1977, on the roadside 3 km north of Olbia (40.95°N, 9.50°E), and given the collector's code CD 77-D (Gorringe and Pullen 1983). The collection site had a gritty, grey, granitic sand of pH 5.5, an altitude of 50 m, and a mean annual rainfall of 675 mm. The site was undergoing earthworks at the time of collection.

York was selected in 1983 by W. J. Collins and J. S. Gladstones, as one of 121 early–midseason breeding lines for distribution to collaborators of the Australasian Subterranean Clover and Alternative Legumes Improvement Program (ASCALIP), formerly known as the National Subterranean Clover Improvement Program (NSCIP), in Western Australia, New South Wales, Victoria, Tasmania, and Queensland, for initial field evaluation. It was one of 10 breeding lines to enter final stage evaluation trials in 1990 in Western Australia, New South Wales, Victoria, South Australia, and Queensland. Selection and testing was conducted under the name CPI 89846B.

Field evaluation and final selection of York were conducted by the following collaborators of the ASCALIP:

P. G. H. Nichols and D. A. Nicholas (Department of Agriculture Western Australia), B. S. Dear (New South Wales Agriculture), S. G. Clark and K. F. M. Reed (Victorian Department of Agriculture), C. T. deKoning and W. Bellotti (South Australian Research and Development Institute), and D. L. Lloyd (Queensland Department of Primary Industries). Screening for disease and insect resistance was conducted by D. J. Gillespie and M. J. Barbetti (Western Australian Department of Agriculture). Phytophthora root rot screening was conducted by S. P. Flett (Victorian Department of Agriculture). Isoflavone analyses were provided by the University of Western Australia.

Submitted for registration by the collaborating organisations of the ASCALIP and recommended for registration by the Western Australian State Pasture Industry Advisory Committee. York has been described in a Plant Breeders Rights application (Nichols 1994). The Western Australian Department of Agriculture will maintain breeders' seed.

Morphological description

York has a leaf mark consisting of a pale green, triangular crescent extending about two-thirds to the margin, flanked by narrow, white arms. The leaf mark is classified as C2A1 using the system in Collins *et al.* (1984). Leaflets are moderately broad and have only a slight indentation. They have a moderately weak tendency to produce a brown anthocyanin flush surrounding the crescent and along the midrib. This is particularly noticeable under cold and other growth-limiting conditions. Anthocyanin flecking is absent. Stipule pigmentation under closed canopies is moderate. Calyx tubes have a purplish-red pigmentation along their distal three-quarters. Stems and peduncles are moderately hairy, while petioles have a few hairs and leaf upper surfaces are glabrous.

Seedlings of York are relatively small and fine, being similar to Daliak. Growth habit is similar to other subterranean clovers of Sardinian origin such as Denmark and Goulburn, being relatively prostrate, particularly in the early stages, and with individual plants maintaining a high leaf density throughout the season. Stems and peduncles are slender. Burr burial is moderately strong with burrs being mainly distributed close to the crown. Seed black, about 140 000 seeds/kg.

Agronomic characters

York is of early–midseason maturity. At Perth, Williams, Darkan, and Wundowie in Western Australia, and Toowoomba in Queensland, York flowered at the same time as Seaton Park. Fresh leaves of York contain only a trace (<0.05% of dry matter) of formononetin. The levels of genistein and biochanin A are 1.5 and 0.7% of dry matter, respectively. York

is relatively hardseeded. In 6 laboratory tests conducted over different seasons, York had 59% hard seed after 4 months of 60°/15°C diurnal temperatures, compared with Seaton Park with 26%, Junee with 32%, Dinninup with 50%, and Dalkeith with 56%.

York has an intermediate reaction to clover scorch [*Kabatiella caulivora* (Kirchn.) Karak] disease. In 7 field screening trials, York has had an average rating of 5.8, compared with Seaton Park, Woogenellup, Junee, Dinninup, and Esperance with 7.7, 6.6, 2.9, 7.4 and 1.1, respectively (increasing disease severity scale of 0–10). Under favourable conditions for development of clover scorch disease, stands of York will suffer some losses when grown for hay or seed production. York has good resistance to root rot caused by race 0 and race 2 of *Phytophthora clandestina* Taylor, Pascoe and Greenhalgh, but is susceptible to race 1. In greenhouse seedling tests, with an increasing disease severity scale of 0–10, York had ratings of 0.5, 7.1, and 0.2, for races 0, 1, and 2, respectively, compared with Seaton Park with 0.5, 1.3, and 0.1, Junee with 7.6, 4.8, and 7.3, and Woogenellup with 6.2, 8.0, and 6.0.

The susceptibility of York to damping off caused by each of the soil-borne pathogens *Pythium irregulare* Buisman, *Rhizoctonia solani* Kühn, and *Fusarium avenaceum* (Fr.) Sacc. was determined in growth room tests. York is rated as moderately susceptible to damping off caused by *P. irregulare*, compared with Seaton Park highly susceptible, Junee susceptible, and Karridale resistant. York is one of the most resistant cultivars to damping off caused by *R. solani*, being rated, along with Goulburn and Leura, as moderately resistant, compared with Seaton Park moderately susceptible and Junee highly susceptible. York, along with Seaton Park, is rated as moderately susceptible to damping off caused by *F. avenaceum*, whereas Junee is resistant and Woogenellup is susceptible.

York has some susceptibility to leaf rust, *Uromyces trifolii-repentis* Liro. In a field trial in Perth the susceptibility of York was not significantly different from that of Seaton Park, but was significantly less than that of Green Range (Barbetti and Nichols 1994). York is susceptible to cercospora leafspot (*Cercospora zebrina* Pass). In a field trial in Perth, York was significantly more susceptible than Seaton Park and Dinninup, but less susceptible than Esperance (Barbetti and Nichols 1994). Field observations of breeding rows in Perth indicate that York has strong resistance to powdery mildew, *Erysiphe polygonii* DC.

York is susceptible to redlegged earth mite, *Halotydeus destructor* (Tucker), particularly at the seedling stage. Growth room tests on 2-week-old seedlings have given mean ratings of 5.9 for York, 5.7 for Seaton Park, 5.2 for Junee, and 5.6 for Woogenellup (on an increasing damage severity rating of 0–10). Field observations from New South Wales suggest that

York is less susceptible to damage from lucerne flea, *Sminthurus viridis*, than Seaton Park and Junee. Preliminary glasshouse tests also suggest that York is less susceptible to damage from blue-green aphid, *Acyrtosiphon kondoi* Shinji, than Seaton Park and Junee.

The performance of York has been excellent in field trials conducted throughout the medium to high rainfall areas of Western Australia, New South Wales, Victoria, South Australia, and Queensland, where it has consistently produced much denser regenerating seedling stands in autumn and early winter than Seaton Park and other early-midseason cultivars. This superiority over Seaton Park at the true break of season has been even more apparent following earlier 'false breaks' to the season. Total annual herbage production of York has been at least as high as Seaton Park, and spring herbage production has been similar. York has consistently produced and maintained higher seed populations than other early-midseason cultivars. Of significance was the trend observed in all States for the density of York, relative to Seaton Park, to increase with time. In Western Australia, York also maintained purity and resisted invasion by Dinninup and other volunteer clovers more successfully than other cultivars.

York will be recommended in Western Australia, New South Wales, Victoria, South Australia, and Queensland for the existing Seaton Park zone. This corresponds to a growing-season length of 5–7 months. Its higher hardseededness makes it better suited than Seaton Park to pasture-crop rotation systems and to more marginal rainfall environments.

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References

- Barbetti, M. J., and Nichols, P. G. H. (1994). Field resistance in *Trifolium subterraneum* to *Uromyces trifolii-repentis* and *Cercospora zebrina*. *Australian Journal of Experimental Agriculture* **34**, 1131–6.
- Collins, W. J., Francis, C. M., and Quinlivan, B. J. (1984). Registered cultivars of subterranean clover—their origin, identification and potential use in Western Australia. Bulletin No. 4083. Western Australian Department of Agriculture.
- Gorringe, R. J., and Pullen, R. (1983). Australian Plant Introduction Review. 15(2), A-45. CSIRO Division of Plant Industry.
- Nichols, P. G. H. (1994). Subterranean clover, *Trifolium subterranean* ssp. *subterranean*, 'York'. *Australian Plant Varieties Journal* **7**, 41–2.